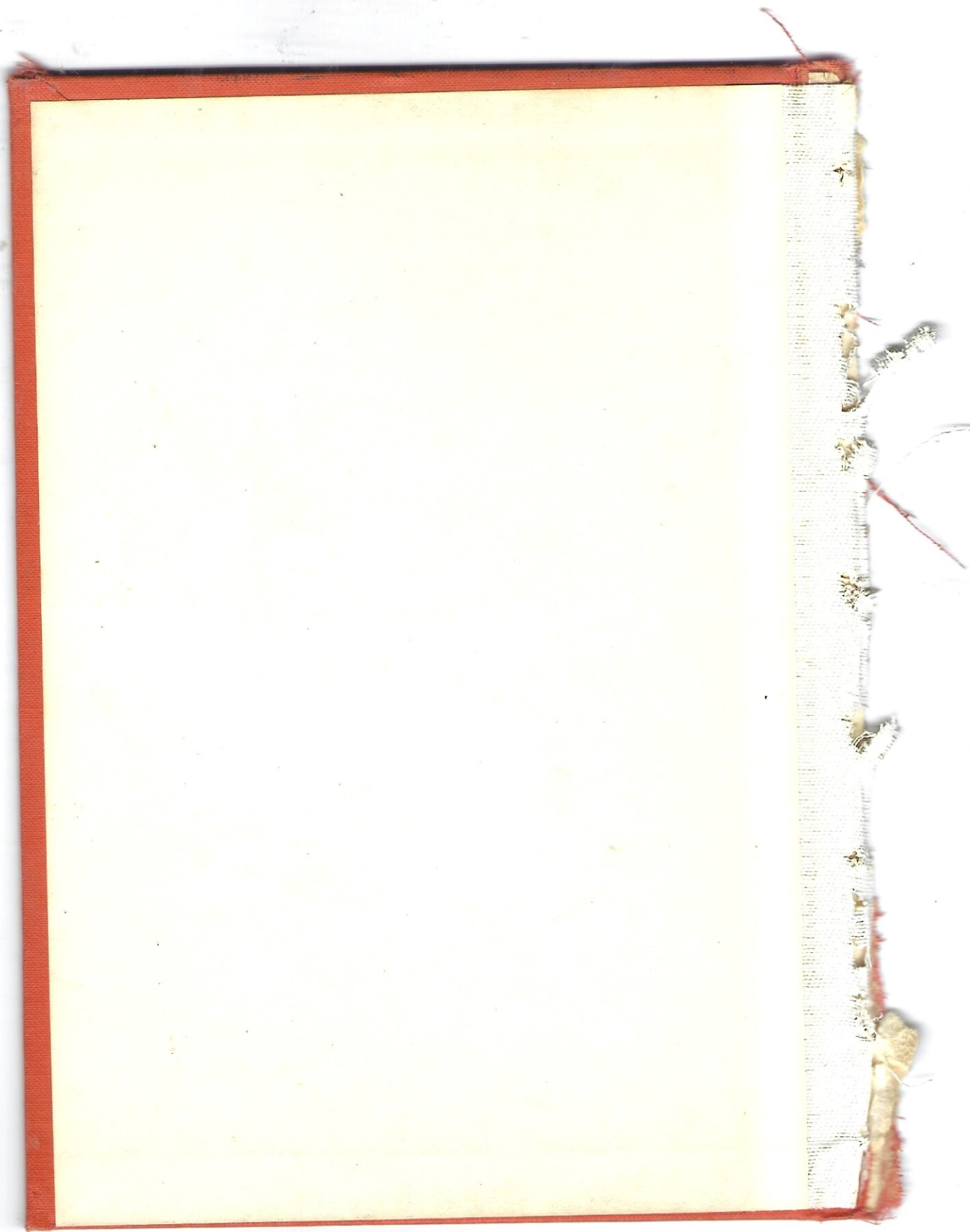




**Making Sure
of
Arithmetic**





Robert Lee Morton • Merle Gray
Elizabeth Springstun • William L. Schaaf

Making Sure of Arithmetic

SILVER BURDETT COMPANY

New York Chicago Dallas San Francisco

FOREWORD

In preparing the New Edition of MAKING SURE OF ARITHMETIC, the goal has been to keep this series the finest learning tool in the field. Each book has been extensively revised, redesigned, and completely reillustrated.

As in the earlier edition, first attention is given to the way the child learns. How can we give him the security of understanding which he needs and wants? How can we help him develop a sense of sureness and confidence in his own everyday uses of arithmetic?

The authors of MAKING SURE OF ARITHMETIC believe these things can be done only by the most careful development of each new idea; by immediately providing rich and extensive experience in using the idea; by maintaining skill and facility in using it; by constantly calling attention to relationships; and perhaps most important of all, by recognizing that the child does not learn "all at once" but must be consistently given the opportunity to re-learn and to deepen understanding.

This means re-teaching the basic ideas of arithmetic at each grade level. It means the maintaining, enriching, and extending of earlier learnings as well as the beginning of new learnings. Only in this way can we make sure of the child's continuous growth in understanding and skill.

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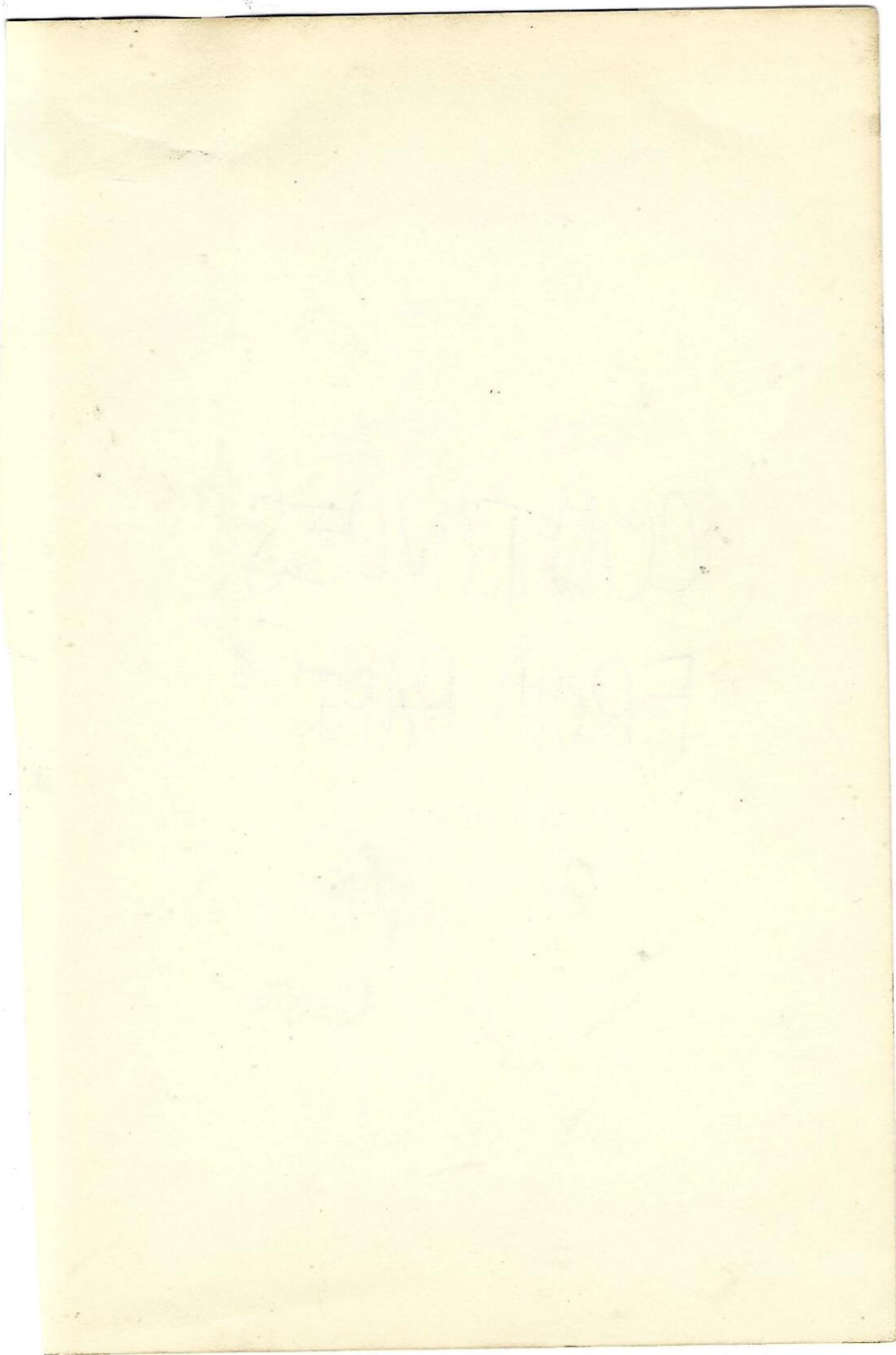
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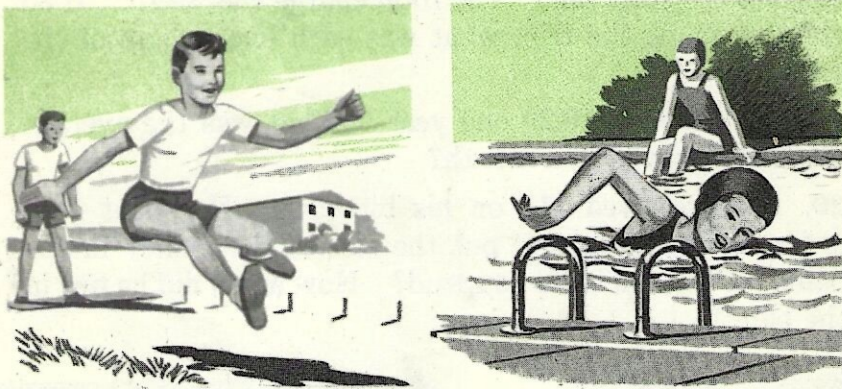
4

LEARNING TO ADD AND SUBTRACT LIKE FRACTIONS

Fractions in Everyday Life

We all use arithmetic in some way each day. Most of us find that we use fractions as often as we use whole numbers. Name some ways in which you use fractions.

Look at the pictures below. Notice how fractions are used in the sentences which follow.

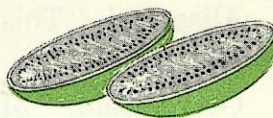


1. In a running broad jump George jumped $10\frac{1}{2}$ feet. James jumped $9\frac{3}{4}$ feet.
2. Bob ran the 50-yard dash in $9\frac{4}{5}$ seconds. Frank ran it in $9\frac{2}{5}$ seconds.
3. Alice swam the width of the pool in $\frac{1}{2}$ minute.
4. Ted made a touchdown in the first quarter of the game.
5. One-half of the class took part in the swimming meet.

Use fractions to write five sentences about sports.

Equal Parts of a Whole

1. The watermelon at the right has been divided into how many equal parts? What is each part called?



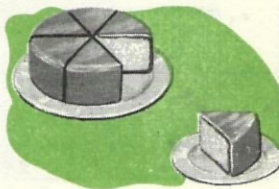
2. Into how many equal parts has the candy bar been divided?



3. What part of this dish is filled with candy? What part is filled with nuts? What part is empty?



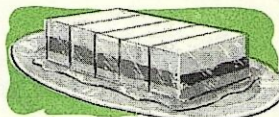
4. Mrs. Mercer has cut the sponge cake into how many equal pieces? What part of the cake did she put on a plate? What part of the sponge cake is yet to be served?



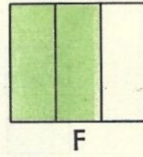
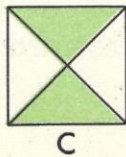
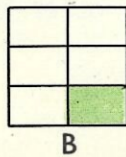
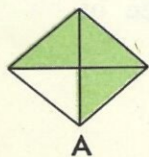
5. The first page of this newspaper has 8 columns. One column tells about the United Nations. What part of the page tells about the United Nations?



6. This brick of ice cream has been divided into how many equal pieces? Each piece is what part of the whole?



7. Study the figures below. What fraction tells the part of each figure that is white? What fraction tells the part of each figure that is green?



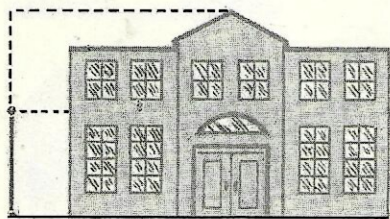
Using Fractions to Compare Objects

Alice said, "This doll is just one-half as tall as my new one."

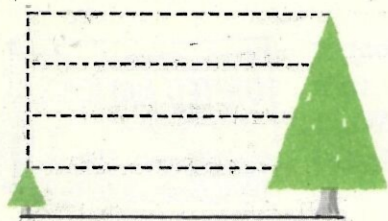
George said, "My fishing pole is two-thirds as long as my father's."

We often use fractions to compare objects, just as Alice and George did.

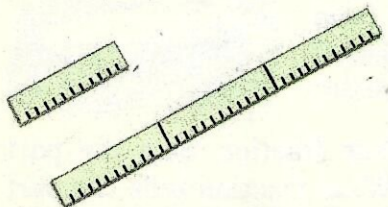
Study the pictures as you answer these questions:



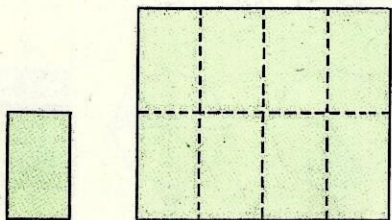
1. The flagpole is $\frac{1}{3}$ as tall as the school building. The building is 3 times as tall as the flagpole.



2. The small pine tree is $\frac{1}{2}$ as tall as the other pine tree.

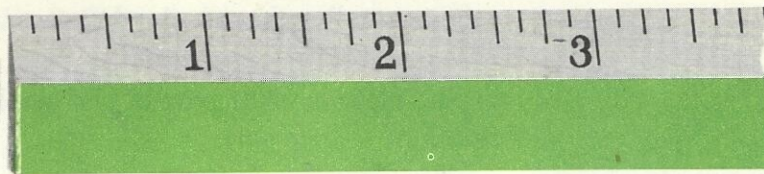


3. The ruler is $\frac{1}{3}$ as long as the yardstick. The yardstick is 3 times as long as the ruler.



4. The small card is $\frac{1}{6}$ as large as the other piece of cardboard.

Fractions of an Inch



The picture above shows how a ruler may be divided into fractions of an inch. Look at your ruler. Are the inches divided in this way?

1. How many $\frac{1}{2}$ inches are there in 1 inch? Draw a line that is $\frac{1}{2}$ inch long.

2. How many $\frac{1}{4}$ inches are there in 1 inch? Draw a line that is $\frac{1}{4}$ inch long. Draw another that is $\frac{3}{4}$ inch long.

3. It is one-eighth of an inch from one line to the next on this ruler, for each inch has been divided into 8 equal parts. How many eighths are there in one-half inch? in one-fourth inch? in three-fourths inch?

4. Use your ruler to measure the following lines. Write on your paper the length of each line.

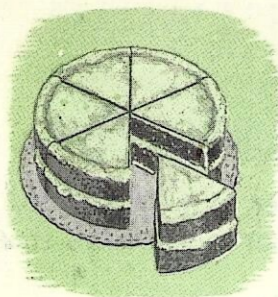
- A. _____
- B. _____
- C. _____
- D. _____
- E. _____
- F. _____

5. Draw lines of the following lengths. Use your ruler and see how accurately you can measure.

$3\frac{1}{8}$ in. $3\frac{3}{4}$ in. $2\frac{3}{8}$ in. $2\frac{5}{8}$ in. $2\frac{1}{2}$ in. $2\frac{7}{8}$ in.

6. Which is more, $\frac{1}{2}$ or $\frac{3}{8}$ inch? $\frac{1}{4}$ or $\frac{3}{8}$ inch? $\frac{5}{8}$ or $\frac{1}{2}$ inch? Which is more, $\frac{3}{4}$ or $\frac{5}{8}$ inch? $\frac{7}{8}$ or $\frac{3}{4}$ inch?

Reading and Writing Fractions

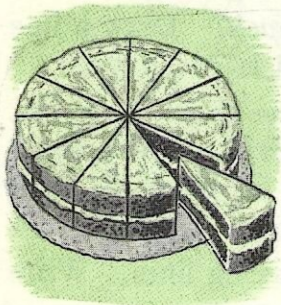


The small cake at the left is divided into how many equal pieces?

One piece is what part of the whole cake?

This fraction is written $\frac{1}{6}$. The 6 tells the number of equal pieces there are in the cake. It is called the **denominator** of the fraction.

The 1 in the fraction $\frac{1}{6}$ tells how many parts of the cake were taken. It is called the **numerator** of the fraction.



The large cake is divided into how many equal pieces?

One piece is what part of the whole cake? How is this fraction written in figures?

What does the denominator of this fraction tell? What does the numerator tell?

► You see that the **denominator** is the number written **below** the line in a fraction. It always tells the number of equal parts into which a whole thing has been divided.

The **numerator** is the number written **above** the line. It tells how many of these equal parts we are talking about.

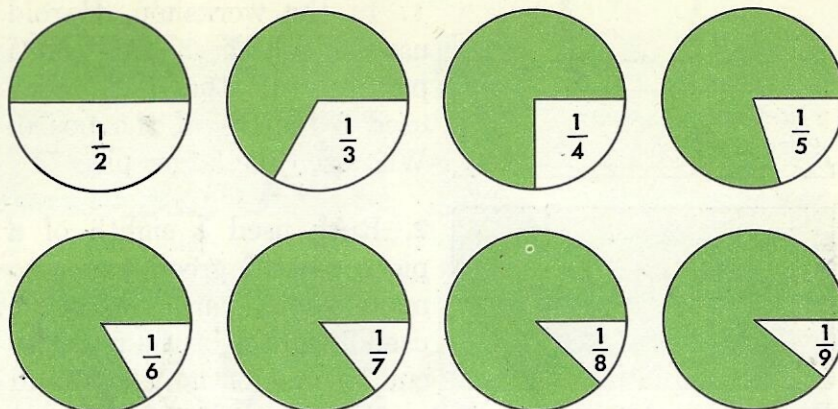
$\frac{1}{3}$	numerator	$\frac{2}{3}$	numerator
3	denominator	3	denominator

The numerator and denominator are called the **terms of a fraction**.

Tell what the numerator and denominator mean in each of the fractions below:

- | | | |
|---------------------------------|-----------------------------|-----------------------------|
| 1. $\frac{1}{2}$ of an apple | 3. $\frac{7}{12}$ of a cake | 5. $\frac{3}{5}$ of a pie |
| 2. $\frac{3}{4}$ of a candy bar | 4. $\frac{1}{3}$ of a melon | 6. $\frac{5}{8}$ of a pound |

Comparing Fractions



Study the figures above to help you answer the following questions about these fractions.

1. Which fraction is larger?

- | | | |
|-----------------------------------|-----------------------------------|-----------------------------------|
| A. $\frac{1}{2}$ or $\frac{1}{3}$ | D. $\frac{1}{7}$ or $\frac{1}{5}$ | G. $\frac{1}{9}$ or $\frac{1}{5}$ |
| B. $\frac{1}{6}$ or $\frac{1}{4}$ | E. $\frac{1}{3}$ or $\frac{1}{8}$ | H. $\frac{1}{4}$ or $\frac{1}{2}$ |
| C. $\frac{1}{4}$ or $\frac{1}{7}$ | F. $\frac{1}{6}$ or $\frac{1}{9}$ | I. $\frac{1}{3}$ or $\frac{1}{5}$ |

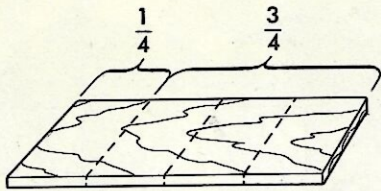
2. Which part would you rather have?

- | | |
|--|---|
| A. $\frac{1}{4}$ or $\frac{1}{8}$ of a pineapple | D. $\frac{1}{6}$ or $\frac{1}{8}$ of a pie |
| B. $\frac{1}{2}$ or $\frac{1}{5}$ of a dime | E. $\frac{1}{3}$ or $\frac{1}{4}$ of a candy bar |
| C. $\frac{1}{4}$ or $\frac{1}{5}$ of a dollar | F. $\frac{1}{4}$ or $\frac{1}{6}$ of a watermelon |

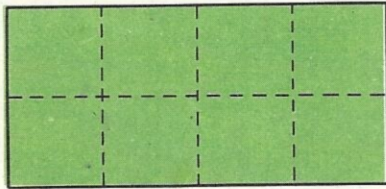
You know that if an apple is divided into fourths, each part is smaller than if the apple had been divided into thirds or halves. If a cake is divided into eighths, each piece is smaller than if the cake had been divided into sixths or fifths.

The more equal parts into which an object is divided, the smaller each part is.

Comparing Fractions



1. In the workshop, Harold used 1 fourth of the board pictured at the left. Dan used 3 fourths of the board. Who used the larger piece?



2. Ruth used 1 eighth of a piece of stiff green paper to make a small card. Marjorie used 3 eighths of the paper to cut letters for a poster, and Virginia used 4 eighths of it. Who used the largest part of the paper? Who used the smallest part?

3. Arrange these fractions according to size, copying the smallest fraction first:

A. 3 sixths, 5 sixths, 2 sixths

C. $\frac{7}{8}$, $\frac{3}{8}$, $\frac{5}{8}$

B. 2 fifths, 4 fifths, 1 fifth, 3 fifths

D. $\frac{5}{12}$, $\frac{7}{12}$, $\frac{1}{12}$

4. The two fractions, $\frac{1}{8}$ and $\frac{7}{8}$, have the same denominator but different numerators. Which fraction is larger, the one with the smaller, or the one with the larger numerator?

5. A. How many halves equal one whole? $\frac{?}{2} = 1$

B. How many thirds equal a whole? $\frac{?}{3} = 1$

C. How many fourths equal a whole? $\frac{?}{4} = 1$

► When the numerator and denominator of a fraction are equal, as in $\frac{2}{2}$, $\frac{3}{3}$, and $\frac{4}{4}$, the fraction is always equal to one whole.

6. A. How many sixths equal one whole?

B. How many eighths equal a whole?

C. How many twelfths equal a whole?

Fractions Which Are Equal in Value

A

One							
$\frac{1}{2}$				$\frac{1}{2}$			
$\frac{1}{4}$		$\frac{1}{4}$		$\frac{1}{4}$		$\frac{1}{4}$	
$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

B

One											
$\frac{1}{3}$				$\frac{1}{3}$				$\frac{1}{3}$			
$\frac{1}{6}$		$\frac{1}{6}$		$\frac{1}{6}$		$\frac{1}{6}$		$\frac{1}{6}$		$\frac{1}{6}$	
$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$

C

One					
$\frac{1}{2}$			$\frac{1}{2}$		
$\frac{1}{3}$		$\frac{1}{3}$		$\frac{1}{3}$	
$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

D

One											
$\frac{1}{2}$						$\frac{1}{2}$					
$\frac{1}{4}$			$\frac{1}{4}$			$\frac{1}{4}$			$\frac{1}{4}$		
$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$

Drawings A, B, C, and D show that different fractions may be equal in value.

Study the drawings, as you work the examples below. They will help you see what number belongs where there is a question mark in a fraction.

Copy the examples below and supply the correct numbers:

- | | | | |
|---------------------------------|------------------------------|------------------------------|-------------------------------|
| A | B | C | D |
| 1. $\frac{2}{12} = \frac{?}{6}$ | $\frac{2}{8} = \frac{?}{4}$ | $\frac{1}{3} = \frac{?}{6}$ | $\frac{4}{6} = \frac{?}{12}$ |
| 2. $\frac{1}{2} = \frac{?}{12}$ | $\frac{1}{2} = \frac{?}{4}$ | $\frac{1}{2} = \frac{?}{6}$ | $\frac{9}{12} = \frac{?}{4}$ |
| 3. $\frac{4}{12} = \frac{?}{6}$ | $\frac{3}{4} = \frac{?}{8}$ | $\frac{4}{6} = \frac{?}{3}$ | $\frac{10}{12} = \frac{?}{6}$ |
| 4. $\frac{6}{12} = \frac{?}{6}$ | $\frac{4}{8} = \frac{?}{2}$ | $\frac{6}{12} = \frac{?}{4}$ | $\frac{4}{8} = \frac{?}{4}$ |
| 5. $\frac{1}{2} = \frac{?}{8}$ | $\frac{3}{4} = \frac{?}{12}$ | $\frac{3}{6} = \frac{?}{2}$ | $\frac{3}{12} = \frac{?}{4}$ |
6. How many sixths equal $\frac{3}{8}$? How many eighths equal $\frac{4}{4}$?
 7. $\frac{1}{4}$ is how many times as large as $\frac{1}{8}$?
 8. $\frac{1}{2}$ is how many times as large as $\frac{1}{6}$?
 9. $\frac{1}{3}$ is how many times as large as $\frac{1}{6}$?



Fractional Parts of a Group

1. How many children do you see in the picture above? Each child is what part of the whole group?

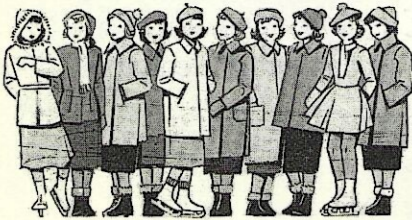
How many boys are skating? This is what fractional part of the whole group?

How many girls are skating? This is what fractional part of the whole group?

What fractional part of the group is watching the skaters?

How many boys are there in the picture? This is what fractional part of the group?

How many children are skating? This is what fractional part of the group?



2. How many girls are there in the picture at the left? What fraction tells what part of the group have skates on? What fraction tells what part of the group are not wearing skates?

3. How many boys are pictured at the right? One boy is what part of the whole group? What fraction tells what part of the group are wearing skates?



4. John had 12 posters to divide equally among 6 classes at school. Each class will receive what part of the posters? How many posters should John take to each class?

5. There were 20 words in the spelling list. Miss Roe said, "One-half of these words are new." How many were new?

6. Ted missed $\frac{1}{5}$ of the 20 words. How many words did he miss?

7. Barbara cut a pan of fudge into 18 pieces. She gave $\frac{1}{3}$ of them to Alice. How many pieces did she give to Alice?

8. Twenty-four children were going on a picnic. Some of the mothers were going to take them in cars. Mrs. Olson said, "One-fourth of the children may ride in my car." How many rode with Mrs. Olson?

9. Jean's mother took $\frac{1}{2}$ of the children in a station wagon. How many children rode in the station wagon?

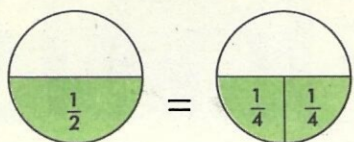
10. Ralph had \$42 in the bank. He spent $\frac{1}{6}$ of his money for a sled. How much did he spend for the sled?

11. Thirty-six children were playing "circle dodgeball." One-fourth of the children were in the center of the large circle. How many were in the center of the large circle?

12. Dan had 16 Christmas cards to send. He mailed $\frac{1}{8}$ of them. How many cards did he mail?

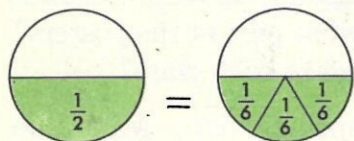
13. Mrs. Rogers baked 24 cupcakes and served $\frac{1}{3}$ of them at lunch. How many cupcakes did she serve?

Equal Fractions



1. When we change one-half to fourths, we have twice as many parts as we had before.

$$\frac{1}{2} = \frac{2}{4}$$

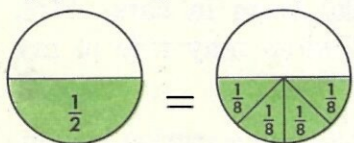


2. When we change one-half to sixths, we have ? times as many parts as we had before.

$$\frac{1}{2} = \frac{?}{6}$$

When we say, "3 times as many parts," or "3 times as many sixths as halves," we really are multiplying. There are three 2's in 6. When we change one-half to sixths, we multiply both the denominator, 2, and the numerator, 1, by 3. The new fraction is $\frac{3}{6}$.

3. Change $\frac{1}{2}$ to eighths. By what number must you multiply 2 to get 8? By what number, then, must you multiply the denominator of the



fraction $\frac{1}{2}$ to change it to eighths? Multiply the numerator by the same number.

$$\frac{4 \times 1}{4 \times 2} = \frac{4}{8}$$

4. Change $\frac{1}{4}$ to twelfths: $\frac{1}{4} = \frac{?}{12}$. By what number must you multiply 4 to get 12? Multiply the numerator by the same number.

5. Tell what the missing numerators are:

A. $\frac{1}{3} = \frac{?}{6}$

C. $\frac{1}{4} = \frac{?}{8}$

E. $\frac{1}{2} = \frac{?}{10}$

B. $\frac{3}{4} = \frac{?}{8}$

D. $\frac{1}{2} = \frac{?}{12}$

F. $\frac{1}{6} = \frac{?}{12}$

When you multiply both the numerator and the denominator of a fraction by the same number, you have a new fraction which is equal to the fraction you had at first.

Changing the Terms of a Fraction

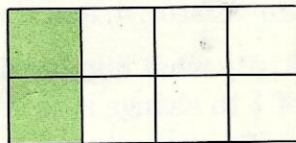
1. Anne practiced on the piano $\frac{1}{4}$ hour in the morning and $\frac{1}{4}$ hour in the evening. What part of an hour did she practice that day?

One-fourth and one-fourth equal two-fourths, or $\frac{2}{4}$ half.

We can say that Anne practiced $\frac{2}{4}$ hour, or $\frac{1}{2}$ hour. Either is correct, as the fractions $\frac{2}{4}$ and $\frac{1}{2}$ have the same value. But we usually say, "Anne practiced $\frac{1}{2}$ hour." We use the fraction having the smaller denominator.

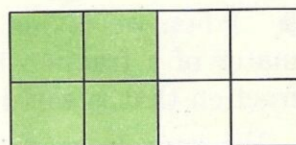
When two fractions have the same value, it is usually more convenient to use the one which has the smaller denominator.

2. Dick divided his garden into 8 equal parts. Drawing A shows the part of the garden he planted on Monday. He planted $\frac{2}{8}$; this is the same as $\frac{1}{4}$.



A

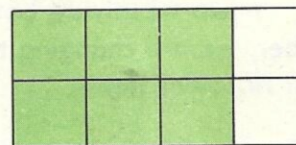
3. Drawing B shows the part he planted in two days. He had planted $\frac{4}{8}$, or $\frac{1}{2}$.



B

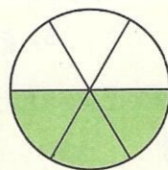
4. Can you tell from Drawing B whether $\frac{4}{8}$, $\frac{2}{4}$, and $\frac{1}{2}$ are all fractions of equal value?

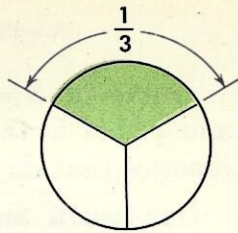
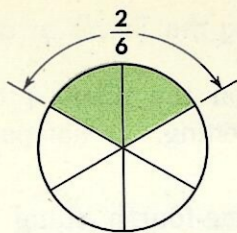
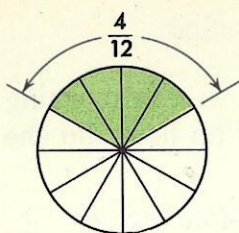
5. The third day he had planted $\frac{3}{8}$ of his garden. Can you write this fraction with smaller numbers? What smaller numbers should you use?



C

6. Jane divided a cake into 6 equal pieces. She gave Ruth 3 pieces. What part of the cake did she give away?





7. Are these three fractions, $\frac{4}{12}$, $\frac{2}{6}$, and $\frac{1}{3}$, equal in value? Can you tell from the circles above?

When $\frac{1}{3}$ is changed to twelfths, we have four times as many parts, but each one is only $\frac{1}{4}$ as large. To change $\frac{1}{3}$ to twelfths, we multiply both the numerator and the denominator by 4.

$$\frac{4 \times 1}{4 \times 3} = \frac{4}{12}$$

To change $\frac{4}{12}$ to $\frac{1}{3}$, we divide both the numerator, 4, and the denominator, 12, by 4.

$$\frac{4 \div 4}{12 \div 4} = \frac{1}{3}$$

8. By what number do we multiply the terms of $\frac{1}{3}$ to change it to sixths?

Then to change $\frac{2}{6}$ to $\frac{1}{3}$, by what number will we divide both the 2 and the 6?

$$\frac{2 \div 2}{6 \div 2} = \frac{1}{3}$$

► When we divide both the numerator and the denominator of a fraction by the same number, we get another fraction that is equal to the first fraction.

We have learned that the numerator and denominator are called the terms of a fraction.

When we divide both terms of a fraction by the same number, we are changing the fraction to **lower terms**, or **reducing it to lower terms**.

9. The fractions below have been reduced to lower terms. By what number were both terms of each fraction divided?

A. $\frac{6}{8} = \frac{3}{4}$ B. $\frac{4}{6} = \frac{2}{3}$ C. $\frac{2}{4} = \frac{1}{2}$ D. $\frac{4}{8} = \frac{1}{2}$ E. $\frac{8}{10} = \frac{4}{5}$

10. Reduce the following fractions to lower terms:

$$\frac{3}{6} \quad \frac{3}{12} \quad \frac{10}{12} \quad \frac{3}{9} \quad \frac{9}{12} \quad \frac{2}{8} \quad \frac{6}{8} \quad \frac{2}{10}$$

Reducing Fractions to Lowest Terms

Marjorie bought 6 green peppers for her mother. What part of a dozen did she buy?



One pepper is $\frac{1}{12}$ of a dozen, so 6 peppers are $\frac{6}{12}$ of a dozen.



Marjorie changed the fraction $\frac{6}{12}$ to $\frac{1}{2}$ by dividing both the numerator and the denominator by 6.

$$\frac{6 \div 6}{12 \div 6} = \frac{1}{2}$$

Marjorie said, "I bought $\frac{1}{2}$ dozen peppers."

You can see that Marjorie divided by the **largest number** that will divide both terms of the fraction evenly.

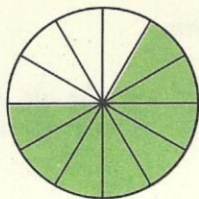
► When a fraction has been changed in this way, we say that it is **reduced to lowest terms**.

1. $\frac{6}{24} = \frac{?}{4}$. By what number should you divide the numerator and the denominator?
2. How can $\frac{4}{16}$ be changed to fourths?
3. How can $\frac{8}{12}$ be changed to thirds?

Copy these fractions and reduce them to lowest terms. Divide by the largest number which will divide both terms of each fraction evenly.

A	B	C	D	E	F
4. $\frac{2}{4}$	$\frac{4}{6}$	$\frac{8}{16}$	$\frac{4}{10}$	$\frac{6}{9}$	$\frac{12}{24}$
5. $\frac{10}{15}$	$\frac{2}{12}$	$\frac{3}{24}$	$\frac{6}{12}$	$\frac{4}{12}$	$\frac{4}{8}$

You may find that you did not divide by the largest number possible. Then you need to divide again, until there is no number, except 1, by which both terms can be divided.



Helen cut a cake into 12 pieces and served 8 pieces, or $\frac{8}{12}$ of the cake, at dinner. How can this fraction be reduced?

Helen changed the fraction $\frac{8}{12}$ to $\frac{4}{6}$ by dividing the terms of the fraction by 2.

Then she said, "The fraction $\frac{4}{6}$ is not reduced to lowest terms. I can still divide both terms by 2 and get the fraction $\frac{2}{3}$. I served $\frac{2}{3}$ of the cake at dinner."

Her brother said, "You could have divided both the numerator and denominator of $\frac{8}{12}$ by 4, and then you would have reduced the fraction to lowest terms in one step."

Sometimes we divide the numerator and denominator of a fraction by two or more numbers before the fraction is reduced to lowest terms.

6. The examples below show how Dan and Martha reduced $\frac{12}{16}$ to lowest terms. Is their work correct? Who chose the shorter way?

MARTHA

$$\frac{12 \div 2}{16 \div 2} = \frac{6}{8}$$

$$\frac{6 \div 2}{8 \div 2} = \frac{3}{4}$$

DAN

$$\frac{12 \div 4}{16 \div 4} = \frac{3}{4}$$

► A fraction such as $\frac{3}{5}$ is in lowest terms, for you cannot divide both the 3 and 5 evenly by any number except 1.

Some of the fractions below are in lowest terms. Copy the others and reduce them to lowest terms.

	A	B	C	D	E	F	G
7.	$\frac{14}{18}$	$\frac{8}{10}$	$\frac{5}{6}$	$\frac{6}{24}$	$\frac{4}{5}$	$\frac{4}{16}$	$\frac{8}{12}$
8.	$\frac{6}{10}$	$\frac{5}{15}$	$\frac{7}{12}$	$\frac{9}{18}$	$\frac{5}{10}$	$\frac{3}{10}$	$\frac{6}{16}$

Reducing Fractional Parts of Measures

1. If you were asked, "What part of a year is 6 months?" you would answer, " $\frac{1}{2}$ year." You know that there are 12 months in a year, and that 6 is $\frac{1}{2}$ of 12.

There are 12 months in a year.

Then, 1 month is $\frac{1}{12}$ of a year.

And 6 months equal $\frac{6}{12}$ of a year.

Reduced to lowest terms, $\frac{6}{12}$ equals $\frac{1}{2}$.

2. What part of a year is 1 month? What part of a year is 3 months? Show that $\frac{3}{12}$ equals $\frac{1}{4}$. What part of a year is 9 months?

3. How many hours are there in one day? John spends 6 hours in school. What part of the day is he in school?

4. John's father works 8 hours each day. What part of a 24-hour day does he spend at work?

5. How many inches are there in 1 yard? What part of a yard is 9 inches? 18 inches? 27 inches?

6. What part of a pound is 4 oz.? 12 oz.? 8 oz.? 10 oz.?

7. What part of a foot is 8 in.? 2 in.? 4 in.? 10 in.?

8. What part of an hour is 30 minutes? 15 minutes? 20 minutes?

9. What part of a gallon is 2 quarts? 4 pints?

10. How many days are there in November? If 10 days during the month were clear, what fractional part of the month was clear?

11. What part of a bushel is 2 pecks?

12. What part of a minute is 10 seconds?

13. What part of a ton is 500 lb.? 1000 lb.? 1500 lb.?

Keeping in Practice

In the examples below, you will practice adding, subtracting, multiplying, and dividing whole numbers. Check your work to make sure that you have not made any mistakes.

Set I

1. Add:

A	B	C	D	E
8	7	43	58	634
2	3	62	12	858
4	5	78	29	246
7	6	35	36	572
5	9	43	55	566
<u>3</u>	<u>3</u>			

2. Subtract:

725	5024	\$25.30	1435	25083
<u>29</u>	<u>1648</u>	<u>7.85</u>	<u>648</u>	<u>19467</u>

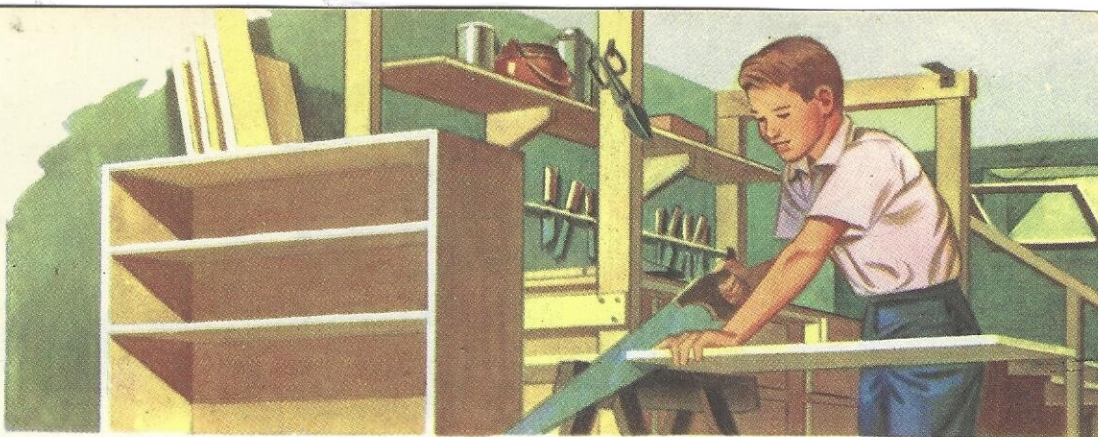
3. Multiply:

438	516	4356	\$7.50	2087
<u>726</u>	<u>980</u>	<u>35</u>	<u>607</u>	<u>48</u>

Set II

Divide:

1. $40 \overline{)3685}$	$73 \overline{)2482}$	$53 \overline{)2150}$	$59 \overline{)4121}$	$95 \overline{)5844}$
2. $28 \overline{)2073}$	$45 \overline{)1693}$	$86 \overline{)7380}$	$29 \overline{)2040}$	$37 \overline{)3580}$
3. $49 \overline{)3212}$	$57 \overline{)1097}$	$83 \overline{)5453}$	$99 \overline{)3983}$	$85 \overline{)3083}$
4. $27 \overline{)18306}$	$32 \overline{)17152}$	$64 \overline{)13376}$	$55 \overline{)46464}$	$68 \overline{)51280}$



Adding Like Fractions

Ralph was making a bookcase. One day he cut $\frac{2}{5}$ of the number of boards that he needed for shelves, and the next day he cut $\frac{1}{5}$ of the number that he needed. What part of the total number of boards did he cut?

To find the answer, add two-fifths and one-fifth:

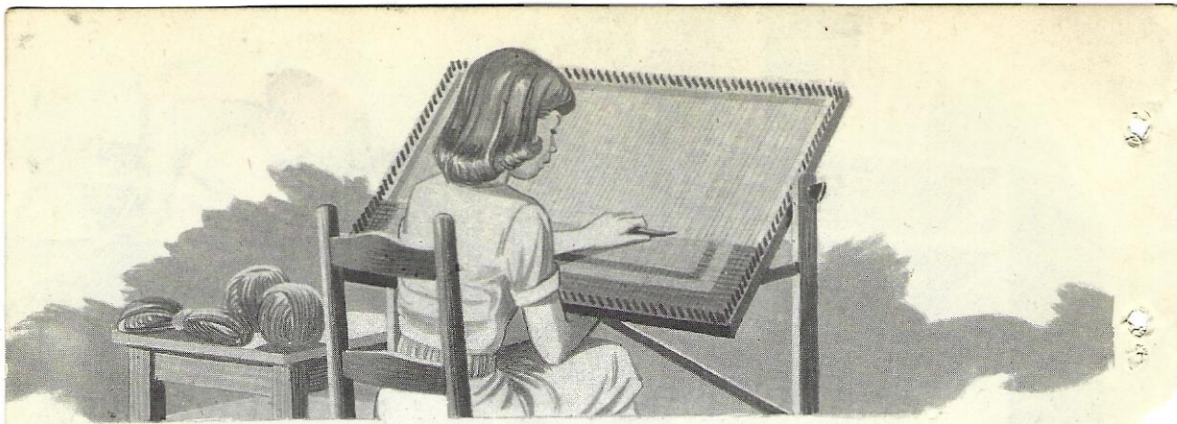
$$\frac{2}{5} + \frac{1}{5} = \frac{3}{5}$$

► Fractions which have the same denominator, such as $\frac{2}{5}$ and $\frac{1}{5}$, are called **like fractions**. The denominators are alike.

It is just as easy to add like fractions as it is to add books to books, pencils to pencils, or pennies to pennies. When we add pennies, the sum is pennies. When we add fifths, the sum is fifths.

Read these statements and supply the missing numbers:

1. 1 kite + 1 kite = ? kites.
1 third + 1 third = ? thirds. $\frac{1}{3} + \frac{1}{3} = \frac{?}{3}$
2. 2 eighths + 3 eighths = ? eighths. $\frac{2}{8} + \frac{3}{8} = \frac{?}{8}$
3. 2 fifths + 2 fifths = ? fifths. $\frac{2}{5} + \frac{2}{5} = \frac{?}{5}$
4. $\frac{3}{12} + \frac{2}{12} = \frac{?}{12}$
5. $\frac{4}{8} + \frac{3}{8} = \frac{?}{8}$



More about Adding Fractions

1. Jane was weaving a small rug with pieces of bright-colored yarn. One day she wove $\frac{1}{3}$ of the rug, and the next day she wove another $\frac{1}{3}$. What part of the rug had she completed then?

To find the answer, add $\frac{1}{3}$ and $\frac{1}{3}$.

$$1 \text{ third} + 1 \text{ third} = \underline{\quad ? \quad} \text{ thirds. } \frac{1}{3} + \frac{1}{3} = \frac{?}{3}$$

The example at the right shows another way in which the fractions may be written and added.

Write $\frac{1}{3}$ under $\frac{1}{3}$. Then add the numerators. They tell *how many* you are adding.

The denominator tells *what* you are adding. Since you are adding thirds, the sum is thirds.

$$\begin{array}{r} \frac{1}{3} = 1 \text{ third} \\ \frac{1}{3} = 1 \text{ third} \\ \hline \frac{2}{3} = 2 \text{ thirds} \end{array}$$

Where is the sum written?

2. Jane had woven $\frac{2}{3}$ of the rug. On Saturday Sally did some weaving for Jane. She wove $\frac{1}{3}$ of the rug. Did the two girls finish weaving the rug?

To find the answer, add $\frac{2}{3}$ and $\frac{1}{3}$. The example at the right shows how these fractions can be added.

$$\begin{array}{r} \frac{2}{3} \\ \frac{1}{3} \\ \hline \frac{3}{3} \end{array}$$

Jane wove $\frac{2}{3}$ of the rug. Sally wove $\frac{1}{3}$ of the rug. Together they wove $\frac{3}{3}$, or all of the rug.

Practice in Adding and Reducing Fractions

1. Helen bought $\frac{1}{4}$ pound of pecans and $\frac{1}{4}$ pound of almonds. What part of a pound of nuts did she buy?

Add the numerators of the fractions just as you add whole numbers.

Write their sum, 2, in the answer, above the denominator.

$$\begin{array}{r} \frac{1}{4} \text{ pound} \\ \frac{1}{4} \text{ pound} \\ \hline \end{array}$$

$$\frac{2}{4} = \frac{1}{2} \text{ pound}$$

To reduce $\frac{2}{4}$ to lowest terms, you divide both the 2 and the 4 by 2.

Helen bought $\frac{1}{2}$ pound of nuts.

2. How is $\frac{4}{10}$ reduced to $\frac{2}{5}$ in the example at the right?

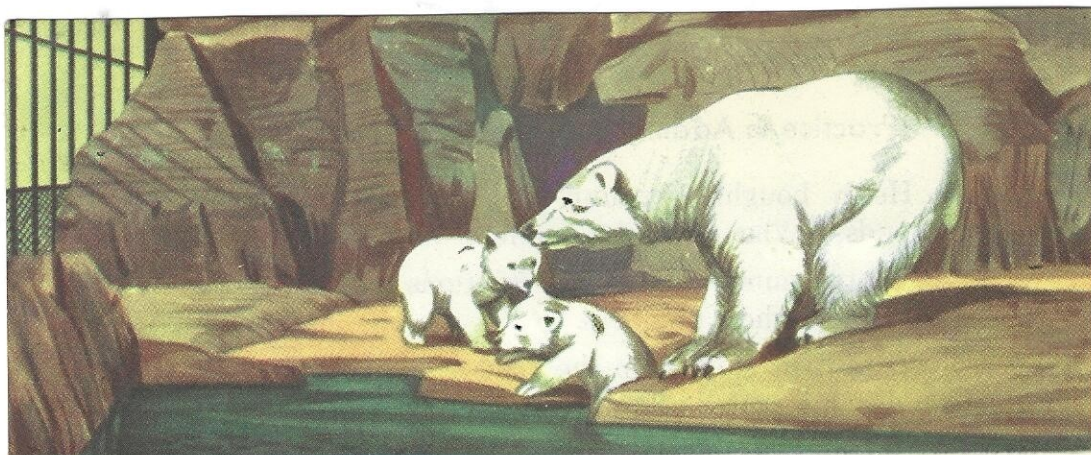
$$\begin{array}{r} \frac{1}{10} \\ \frac{3}{10} \\ \hline \frac{4}{10} = \frac{2}{5} \end{array}$$

Add these fractions. If necessary, reduce the sums to lowest terms.

	A	B	C	D	E	F	G	H
3.	$\frac{1}{6}$ $\frac{1}{6}$	$\frac{7}{10}$ $\frac{1}{10}$	$\frac{1}{5}$ $\frac{1}{5}$	$\frac{5}{12}$ $\frac{5}{12}$	$\frac{3}{8}$ $\frac{3}{8}$	$\frac{1}{16}$ $\frac{3}{16}$	$\frac{3}{20}$ $\frac{3}{20}$	$\frac{7}{12}$ $\frac{1}{12}$
4.	$\frac{3}{8}$ $\frac{1}{8}$	$\frac{1}{3}$ $\frac{1}{3}$	$\frac{1}{12}$ $\frac{5}{12}$	$\frac{3}{10}$ $\frac{3}{10}$	$\frac{5}{16}$ $\frac{5}{16}$	$\frac{1}{9}$ $\frac{5}{9}$	$\frac{7}{20}$ $\frac{3}{20}$	$\frac{3}{5}$ $\frac{1}{5}$

Copy the fractions below and reduce them to lowest terms. Sometimes you may divide the numerator and denominator by two or more numbers before the fraction is reduced to lowest terms.

	A	B	C	D	E	F
5.	$\frac{8}{24}$	$\frac{16}{20}$	$\frac{3}{6}$	$\frac{6}{18}$	$\frac{10}{15}$	$\frac{4}{8}$
6.	$\frac{5}{20}$	$\frac{6}{10}$	$\frac{2}{24}$	$\frac{10}{25}$	$\frac{2}{12}$	$\frac{12}{20}$
7.	$\frac{2}{10}$	$\frac{2}{16}$	$\frac{10}{20}$	$\frac{4}{32}$	$\frac{6}{24}$	$\frac{12}{18}$

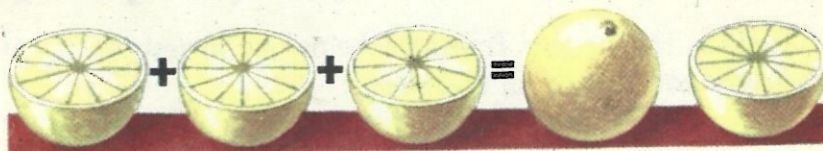


Using Fractions in Problems

1. There are 15 bears in the city zoo. The caretaker says that $\frac{1}{3}$ of them are polar bears. How many polar bears are in the zoo?
2. On certain days admission to the zoo is 25 cents. This is what part of a dollar?
3. One day Frank spent $\frac{1}{4}$ hour watching the polar bears and $\frac{1}{4}$ hour watching the other bears. What part of an hour did he spend watching the bears?
4. Bears who live in the woods hibernate about 5 months each year. This is what part of a year?
5. Frank took 16 pictures at the zoo. Four of the pictures were of the bears. What part of the pictures were of the bears?
6. Frank spent 3 hours at the zoo. What part of a day of 24 hours did he spend there?
7. On Saturday Frank and his father invited 10 boys to go to the zoo. One-fifth of this number could not go. How many boys could not go? How many went?
8. That day Frank bought 24 post cards. He chose the 8 most interesting ones to take to school. What part of the cards did he take to school?

Changing the Form of Fractions

1. Since there are 3 people in Nancy's family, she prepared 3 grapefruit halves for breakfast. How many grapefruits did she use?



How many halves are there in one grapefruit? Then 3 halves equal 1 grapefruit and $\frac{1}{2}$ grapefruit, or $1\frac{1}{2}$.

2. Marjorie used $\frac{2}{3}$ yard of narrow ribbon to trim a doll's dress, and $\frac{2}{3}$ yard to tie a package. How much ribbon did she use?

Think, $\frac{2}{3}$ yard + $\frac{2}{3}$ yard equal how many yards? Then add: $\frac{2}{3} + \frac{2}{3} = \frac{4}{3}$.

How many thirds make one yard?

$\frac{4}{3}$ is $\frac{1}{3}$ more than $\frac{3}{3}$, so you know that $\frac{4}{3}$ is equal to 1 and $\frac{1}{3}$.

Marjorie used $1\frac{1}{3}$ yards of ribbon.

$$\frac{2}{3} \text{ yd.}$$

$$\frac{2}{3} \text{ yd.}$$

$$\frac{4}{3} = 1\frac{1}{3} \text{ yd.}$$

A fraction such as $\frac{1}{3}$, $\frac{3}{4}$, or $\frac{7}{8}$ is called a **proper fraction**. Its numerator is *less* than its denominator. It means less than a whole.

A fraction such as $\frac{3}{2}$, $\frac{4}{3}$, $\frac{2}{2}$, or $\frac{4}{4}$ is called an **improper fraction**. Its numerator is *equal to* or *greater than* its denominator. It means a whole, or more than a whole.

A number such as $1\frac{1}{2}$ or $1\frac{1}{3}$ is called a **mixed number**. A mixed number is a whole number and a fraction.

The improper fraction $\frac{3}{2}$ is equal to the mixed number $1\frac{1}{2}$ because each contains the same number of halves.

Change these improper fractions to mixed numbers:

	A	B	C	D	E	F	G	H
3.	$\frac{8}{7}$	$\frac{5}{4}$	$\frac{6}{5}$	$\frac{7}{4}$	$\frac{11}{8}$	$\frac{8}{5}$	$\frac{5}{2}$	$\frac{11}{9}$
4.	$\frac{5}{3}$	$\frac{7}{6}$	$\frac{15}{8}$	$\frac{9}{5}$	$\frac{4}{3}$	$\frac{11}{6}$	$\frac{9}{4}$	$\frac{8}{3}$

Reduce the proper fractions below to lowest terms, if they are not already in that form:

5.	$\frac{3}{9}$	$\frac{6}{21}$	$\frac{8}{18}$	$\frac{2}{3}$	$\frac{9}{15}$	$\frac{4}{9}$	$\frac{2}{8}$	$\frac{2}{5}$
6.	$\frac{8}{10}$	$\frac{7}{14}$	$\frac{4}{20}$	$\frac{3}{7}$	$\frac{8}{32}$	$\frac{5}{40}$	$\frac{10}{16}$	$\frac{5}{8}$

In the examples below, change each proper fraction to lowest terms. Change each improper fraction to a whole or a mixed number.

7.	$\frac{7}{2}$	$\frac{3}{24}$	$\frac{14}{16}$	$\frac{16}{9}$	$\frac{8}{8}$	$\frac{12}{7}$	$\frac{10}{5}$	$\frac{5}{10}$
8.	$\frac{16}{20}$	$\frac{17}{12}$	$\frac{20}{24}$	$\frac{11}{8}$	$\frac{13}{10}$	$\frac{4}{6}$	$\frac{9}{12}$	$\frac{6}{8}$

9. Make a list of 10 proper fractions.

10. How are proper fractions different from improper fractions?

11. What kind of fractions can be changed to whole or mixed numbers?

12. What kind of fractions are $\frac{4}{4}$, $\frac{5}{5}$, and $\frac{6}{6}$?

KEEPING ON YOUR TOES

1. When you multiply a number by 10, how many zeros do you write to the right of the number?

2. How much is 10×9 ?

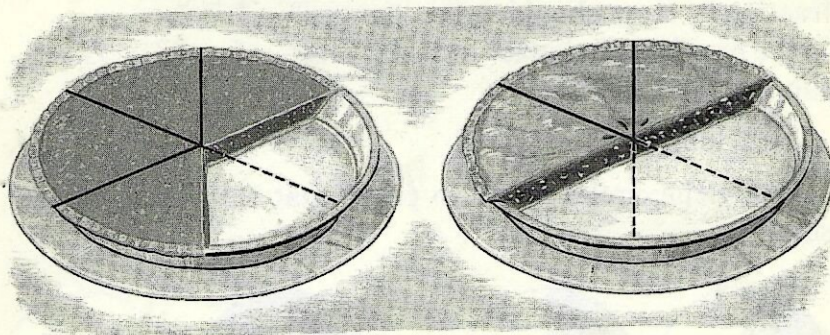
3. How many are 4 tens? 12 tens? 40 tens? 75 tens?

4. How do you find the product of 25 and 30?

5. By what number do you multiply 425 to get 4250?

Changing Fractions to Mixed Numbers

Mrs. Webster baked pumpkin pies and mince pies for New Year's dinner. She cut each pie into sixths. After dinner, she had $\frac{4}{6}$ of a pumpkin pie left and $\frac{3}{6}$ of a mince pie. How many sixths were left? The number of pieces left equals one whole pie and how many sixths of another?



$$\frac{4}{6} + \frac{3}{6} = \frac{7}{6} \quad \frac{7}{6} \text{ pies} = \frac{6}{6} \text{ pie} + \frac{1}{6} \text{ pie} = 1\frac{1}{6} \text{ pies}$$

There were $1\frac{1}{6}$ pies left.

Study the example at the right. Add the numerators, 4 and 3. You see that their sum is written over the denominator.

$$\frac{4}{6} + \frac{3}{6}$$

To change the improper fraction $\frac{7}{6}$ to a mixed number, think, how many sixths make one whole? Then $\frac{7}{6}$ is how much more than one?

$$\frac{7}{6} = 1\frac{1}{6}$$

Whenever the answer to an example is an improper fraction, it should be changed to a whole number or a mixed number.

Copy and add. Change improper fractions to mixed numbers.

A	B	C	D	E	F	G	H
$\frac{4}{5}$	$\frac{5}{9}$	$\frac{6}{7}$	$\frac{3}{5}$	$\frac{11}{15}$	$\frac{2}{3}$	$\frac{3}{5}$	$\frac{3}{7}$
$\frac{2}{5}$	$\frac{5}{9}$	$\frac{5}{7}$	$\frac{3}{5}$	$\frac{11}{15}$	$\frac{2}{3}$	$\frac{4}{5}$	$\frac{6}{7}$

Changing Sums to Mixed Numbers

Saturday morning Jim spent $\frac{3}{4}$ of an hour helping his father shovel snow and $\frac{3}{4}$ of an hour doing an errand for his mother. How long did he work?

Add $\frac{3}{4}$ hour and $\frac{3}{4}$ hour. How do you get the sum $\frac{6}{4}$? This is what kind of fraction? How should $\frac{6}{4}$ be changed? Is the fraction $\frac{6}{4}$ in lowest terms? How can it be reduced?

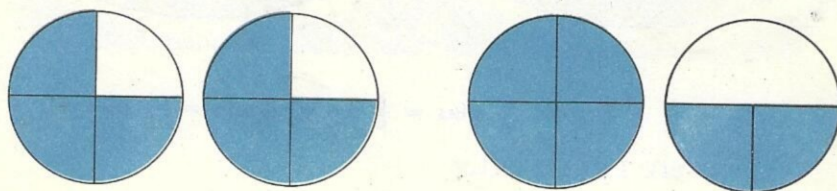
$\frac{3}{4}$ hour

$\frac{3}{4}$ hour

$$\frac{6}{4} = 1\frac{2}{4} = 1\frac{1}{2} \text{ hours}$$

How long did Jim work?

Study the circles below to prove that this is the correct sum.



$$\frac{3}{4} + \frac{3}{4} = \frac{6}{4} = 1\frac{2}{4} = 1\frac{1}{2}$$

► Whenever the answer to an example or a problem is a mixed number, the fraction should be reduced to lowest terms.

Copy and add. Be sure that the fraction in each sum is in lowest terms.

	A	B	C	D	E	F
1.	$\frac{5}{6}$ $\frac{5}{6}$	$\frac{5}{8}$ $\frac{7}{8}$	$\frac{11}{12}$ $\frac{7}{12}$	$\frac{6}{7}$ $\frac{4}{7}$	$\frac{5}{12}$ $\frac{11}{12}$	$\frac{15}{16}$ $\frac{7}{16}$
2.	$\frac{7}{10}$ $\frac{7}{10}$	$\frac{7}{8}$ $\frac{3}{8}$	$\frac{9}{16}$ $\frac{9}{16}$	$\frac{3}{10}$ $\frac{9}{10}$	$\frac{7}{8}$ $\frac{7}{8}$	$\frac{11}{24}$ $\frac{17}{24}$

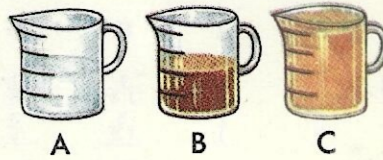
Fractions Which Equal One

1. When making gingerbread, Joan mixed $\frac{1}{2}$ cup of molasses and $\frac{1}{2}$ cup of hot water. How much liquid did she use?

Cup A is $\frac{1}{2}$ full of hot water.

Cup B is $\frac{1}{2}$ full of molasses.

In Cup C, these two halves have been put together to make one whole cup.



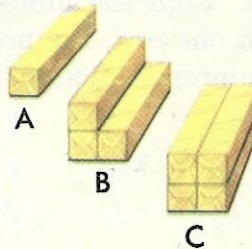
$$\frac{1}{2} \text{ cup} + \frac{1}{2} \text{ cup} = \frac{2}{2}, \text{ or } 1 \text{ cup.}$$

The fractions can also be written as they are at the right.

$$\begin{array}{r} \frac{1}{2} \text{ cup} \\ \frac{1}{2} \text{ cup} \\ \hline \frac{2}{2} = 1 \text{ cup} \end{array}$$

Joan used 1 cup of liquid in making gingerbread.

2. A pound of butter often comes in four quarters. Figure A shows $\frac{1}{4}$ pound of butter. Figure B shows $\frac{3}{4}$ of a pound. In Figure C, $\frac{3}{4}$ and $\frac{1}{4}$ have been put together to make one whole pound.



$$\frac{1}{4} \text{ pound} + \frac{3}{4} \text{ pound} = \frac{4}{4} \text{ pound, or } 1 \text{ pound.}$$

► When the numerator and the denominator of a fraction are equal, as in $\frac{2}{2}$, $\frac{3}{3}$, $\frac{4}{4}$, and $\frac{5}{5}$, the fraction is always equal to a whole, or 1. The fraction is an **improper fraction**. The fraction $\frac{4}{4}$ means all four of the four equal parts of a whole.

3. Copy and add.

A	B	C	D	E	F	G	H
$\frac{7}{8}$	$\frac{3}{10}$	$\frac{1}{6}$	$\frac{4}{7}$	$\frac{1}{3}$	$\frac{3}{5}$	$\frac{1}{2}$	$\frac{5}{12}$
$\frac{1}{8}$	$\frac{7}{10}$	$\frac{5}{6}$	$\frac{3}{7}$	$\frac{2}{3}$	$\frac{2}{5}$	$\frac{1}{2}$	$\frac{7}{12}$

Practicing What You Have Learned

Copy and add. Be sure that the fraction in each sum is in lowest terms.

	A	B	C	D	E	F	G	H
1.	$\frac{1}{5}$ $\frac{3}{5}$	$\frac{1}{4}$ $\frac{1}{4}$	$\frac{1}{12}$ $\frac{5}{12}$	$\frac{1}{8}$ $\frac{3}{8}$	$\frac{1}{9}$ $\frac{4}{9}$	$\frac{3}{10}$ $\frac{1}{10}$	$\frac{1}{6}$ $\frac{1}{6}$	$\frac{1}{3}$ $\frac{1}{3}$
2.	$\frac{1}{16}$ $\frac{1}{16}$	$\frac{1}{7}$ $\frac{4}{7}$	$\frac{5}{8}$ $\frac{1}{8}$	$\frac{2}{5}$ $\frac{2}{5}$	$\frac{1}{12}$ $\frac{1}{12}$	$\frac{1}{10}$ $\frac{7}{10}$	$\frac{5}{16}$ $\frac{3}{16}$	$\frac{2}{9}$ $\frac{1}{9}$
3.	$\frac{3}{5}$ $\frac{4}{5}$	$\frac{7}{9}$ $\frac{7}{9}$	$\frac{11}{16}$ $\frac{7}{16}$	$\frac{5}{12}$ $\frac{11}{12}$	$\frac{7}{12}$ $\frac{5}{12}$	$\frac{3}{7}$ $\frac{4}{7}$	$\frac{1}{10}$ $\frac{9}{10}$	$\frac{2}{3}$ $\frac{1}{3}$

4. Copy the numbers below. Write all the mixed numbers in one row, the proper fractions in a second row, and the improper fractions in a third row.

$1\frac{1}{3}$	$\frac{2}{5}$	$\frac{8}{5}$	$3\frac{1}{4}$	$\frac{10}{3}$	$\frac{5}{6}$	$\frac{5}{8}$	$2\frac{1}{5}$
$\frac{5}{2}$	$10\frac{1}{2}$	$\frac{3}{7}$	$8\frac{5}{8}$	$\frac{24}{12}$	$16\frac{4}{5}$	$\frac{1}{4}$	$\frac{40}{8}$
$3\frac{1}{6}$	$\frac{1}{12}$	$\frac{12}{4}$	$5\frac{1}{10}$	$\frac{11}{6}$	$\frac{2}{3}$	$\frac{5}{16}$	$\frac{17}{10}$

KEEPING ON YOUR TOES

Read the following questions. Tell what fraction answers each question.

1. A pint is what part of a quart?
2. A quart is what part of a gallon?
3. One day is what part of a school week?
4. One inch is what part of a foot?
5. A nickel is what part of a dime?
6. A dime is what part of a dollar?
7. A peck is what part of a bushel?

Adding Fractions and Whole Numbers

1. Marie had $\frac{1}{3}$ yard of checked ribbon, $\frac{1}{3}$ yard of striped ribbon, and 2 yards of plaid ribbon. How much ribbon did she have?

At the right, you see how fractions and whole numbers are written in separate columns.

First add the fractions: $\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$. Then add the whole numbers. There is nothing to add to 2, so write 2 in the sum to the left of the fraction.

$$\begin{array}{r} \frac{1}{3} \text{ yard} \\ \frac{1}{3} \\ \hline 2\frac{2}{3} \text{ yards} \end{array}$$

Marie had $2\frac{2}{3}$ yards of ribbon.

2. John has two turtles that he found near the lake. The larger turtle weighs $2\frac{1}{4}$ pounds. The smaller one weighs $\frac{1}{4}$ pound. What is the combined weight of the turtles?

First add the fractions: $\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$

Write the whole number, 2, to the left of the fraction. Reduce the fraction to lowest terms.

$$\begin{array}{r} 2\frac{1}{4} \text{ pounds} \\ \frac{1}{4} \\ \hline 2\frac{2}{4} = 2\frac{1}{2} \text{ pounds} \end{array}$$

3. Copy and add. If possible, reduce the fractions in the sums.

A	B	C	D	E	F
$\frac{3}{5}$	$4\frac{1}{8}$	6	$3\frac{3}{8}$	$\frac{1}{10}$	$\frac{1}{16}$
$\frac{1}{5}$	$\frac{1}{8}$	$\frac{1}{12}$	$\frac{3}{8}$	8	$\frac{1}{16}$
<u>3</u>		<u>$\frac{7}{12}$</u>		<u>$\frac{3}{10}$</u>	<u>5</u>





Adding Mixed Numbers

1. A group of girls made curtains and costumes for a school play. They used $15\frac{1}{3}$ yards of cloth for the curtains and $12\frac{1}{3}$ yards for the costumes. How many yards of cloth did they use in all?

You add $15\frac{1}{3}$ and $12\frac{1}{3}$ to find the answer. First add the fractions, $\frac{1}{3} + \frac{1}{3}$. Then add the whole numbers. Is the fraction in the sum in lowest terms? How many yards were used?

$$\begin{array}{r} 15\frac{1}{3} \text{ yards} \\ 12\frac{1}{3} \\ \hline 27\frac{2}{3} \text{ yards} \end{array}$$

2. Nancy went shopping with her sister. They bought $1\frac{1}{4}$ yards of material for a blouse, and $2\frac{1}{4}$ yards for a skirt. How many yards of material did they buy in all?

Study the example at the right. How do you get the fraction $\frac{2}{4}$? How do you get the 3 in $3\frac{2}{4}$? How is $\frac{2}{4}$ reduced to lowest terms?

$$\begin{array}{r} 1\frac{1}{4} \text{ yards} \\ 2\frac{1}{4} \\ \hline 3\frac{2}{4} = 3\frac{1}{2} \text{ yards} \end{array}$$

How many yards of material did Nancy and her sister buy?

3. Copy and add. Reduce the fractions in the sums if possible.

A	B	C	D	E	F
$3\frac{1}{5}$	$4\frac{1}{8}$	$12\frac{1}{10}$	$10\frac{3}{8}$	$8\frac{1}{12}$	$15\frac{1}{9}$
$2\frac{2}{5}$	$2\frac{3}{8}$	$16\frac{3}{10}$	$14\frac{3}{8}$	$7\frac{5}{12}$	$6\frac{5}{9}$

Practicing What You Have Learned

Copy these fractions and reduce them to lowest terms:

	A	B	C	D	E	F	G	H
1.	$\frac{3}{18}$	$\frac{12}{15}$	$\frac{10}{24}$	$\frac{4}{20}$	$\frac{6}{9}$	$\frac{16}{24}$	$\frac{6}{36}$	$\frac{3}{15}$
2.	$\frac{2}{10}$	$\frac{3}{24}$	$\frac{14}{20}$	$\frac{6}{20}$	$\frac{9}{24}$	$\frac{10}{40}$	$\frac{12}{30}$	$\frac{16}{32}$

Read the fractions below. Reduce to lowest terms those that can be reduced.

3.	$\frac{3}{7}$	$\frac{2}{4}$	$\frac{6}{8}$	$\frac{6}{12}$	$\frac{7}{8}$	$\frac{3}{12}$	$\frac{2}{3}$	$\frac{5}{10}$
4.	$\frac{2}{16}$	$\frac{4}{5}$	$\frac{8}{16}$	$\frac{2}{6}$	$\frac{1}{10}$	$\frac{5}{12}$	$\frac{3}{9}$	$\frac{5}{6}$

5. Write 5 fractions which are in lowest terms.
6. Write 5 fractions which can be reduced to lower terms.
7. Read the numerators of these fractions: $\frac{1}{3}$, $\frac{3}{5}$, $\frac{7}{8}$.
8. Read the denominators of $\frac{1}{4}$, $\frac{4}{7}$, and $\frac{5}{8}$.
9. Name the largest fraction in each group below:

A. $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{2}$ B. $\frac{1}{3}$, $\frac{1}{6}$, $\frac{1}{5}$ C. $\frac{1}{3}$, $\frac{1}{2}$, $\frac{1}{6}$

10. Name the smallest fraction in each of the groups in Example 9.

Copy and add. Reduce the fractions in the sums to lowest terms.

	A	B	C	D	E	F
11.	$\frac{1}{12}$ $\frac{1}{12}$	$\frac{1}{6}$ $\frac{1}{6}$	$\frac{7}{10}$ $\frac{1}{10}$	$\frac{5}{6}$ $\frac{1}{6}$	$\frac{3}{7}$ 4	$6\frac{1}{18}$ $\frac{1}{18}$
12.	$4\frac{1}{5}$ $3\frac{1}{5}$	$8\frac{1}{8}$ $2\frac{3}{8}$	7 $\frac{3}{4}$	$10\frac{3}{16}$ $2\frac{1}{16}$	$12\frac{1}{5}$ $4\frac{3}{5}$	$5\frac{1}{12}$ $4\frac{7}{12}$
13.	$6\frac{1}{25}$ $4\frac{4}{25}$	$8\frac{3}{10}$ $7\frac{3}{10}$	$9\frac{5}{12}$ $5\frac{5}{12}$	$15\frac{3}{7}$ $12\frac{1}{7}$	$20\frac{5}{8}$ $14\frac{1}{8}$	$25\frac{3}{16}$ $6\frac{5}{16}$

Finding Distances

1. James rides his bicycle to school, a distance of $1\frac{2}{3}$ miles. How many miles does he ride to school and home again?

Add $1\frac{2}{3}$ and $1\frac{2}{3}$. First add the fractions: $\frac{2}{3} + \frac{2}{3} = \frac{4}{3}$. Then add the whole numbers: $1 + 1 = 2$. Think, how many thirds make 1? Then, $\frac{4}{3} = 1\frac{1}{3}$.

So, $2\frac{4}{3} = 2 + 1\frac{1}{3}$, or $3\frac{1}{3}$.

2. Bob lives $1\frac{3}{4}$ miles from school. He takes the bus each way. How many miles does he ride in a day?

$1\frac{3}{4}$ miles + $1\frac{3}{4}$ miles = ? miles.

What is the sum of $\frac{3}{4}$ and $\frac{3}{4}$?

How many are 1 and 1?

How many fourths equal one?

$\frac{6}{4} = \frac{4}{4} + \frac{2}{4}$, or $1\frac{2}{4}$

Then, $2\frac{6}{4} = 3\frac{2}{4}$, or $3\frac{1}{2}$.

$1\frac{3}{4}$ miles

$1\frac{3}{4}$

$2\frac{6}{4} = 3\frac{2}{4} = 3\frac{1}{2}$ miles

3. One Saturday Ted and his father drove to the lake to go skating. It was a distance of $3\frac{1}{2}$ miles from their home. How far did they drive to make the round trip?

$\frac{1}{2} + \frac{1}{2} = \frac{2}{2}$

$3 + 3 = ?$

How many halves equal one?

Then, $6\frac{2}{2} = 6 + \frac{2}{2} = 7$.

$3\frac{1}{2}$ miles

$3\frac{1}{2}$

$6\frac{2}{2} = 7$ miles

4. Copy the following examples and add:

A	B	C	D	E	F
$3\frac{3}{5}$	$2\frac{5}{8}$	$1\frac{1}{4}$	$4\frac{5}{6}$	$5\frac{3}{8}$	$7\frac{9}{16}$
$4\frac{4}{5}$	$3\frac{5}{8}$	$5\frac{3}{4}$	$7\frac{1}{6}$	$2\frac{7}{8}$	$8\frac{7}{16}$

Fractions and Mixed Numbers

Change the improper fractions below to whole or mixed numbers. Each answer should be in lowest terms.

A	B	C	D
1. $\frac{7}{5} = ?$	$\frac{6}{4} = ?$	$\frac{3}{3} = ?$	$\frac{9}{7} = ?$
2. $\frac{14}{8} = ?$	$\frac{12}{10} = ?$	$\frac{15}{12} = ?$	$\frac{8}{6} = ?$

Copy and add. If there is a fraction in the sum, be sure that it is in lowest terms.

A	B	C	D	E	F
3. $\begin{array}{r} 9\frac{4}{5} \\ 4\frac{2}{5} \\ \hline \end{array}$	$\begin{array}{r} 6\frac{3}{8} \\ 2\frac{5}{8} \\ \hline \end{array}$	$\begin{array}{r} 5\frac{13}{24} \\ 4\frac{23}{24} \\ \hline \end{array}$	$\begin{array}{r} 6\frac{3}{7} \\ 7\frac{4}{7} \\ \hline \end{array}$	$\begin{array}{r} 7\frac{17}{20} \\ 8\frac{3}{20} \\ \hline \end{array}$	$\begin{array}{r} 10\frac{7}{12} \\ 6\frac{11}{12} \\ \hline \end{array}$
4. $\begin{array}{r} 1\frac{7}{8} \\ 3\frac{1}{8} \\ \hline \end{array}$	$\begin{array}{r} 9\frac{3}{4} \\ 8\frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{11}{12} \\ 4\frac{5}{12} \\ \hline \end{array}$	$\begin{array}{r} 4\frac{2}{3} \\ 4\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{5}{18} \\ 7\frac{13}{18} \\ \hline \end{array}$	$\begin{array}{r} 12\frac{15}{16} \\ 7\frac{3}{16} \\ \hline \end{array}$
5. $\begin{array}{r} 9\frac{7}{12} \\ 5\frac{7}{12} \\ \hline \end{array}$	$\begin{array}{r} 6\frac{8}{9} \\ 4\frac{8}{9} \\ \hline \end{array}$	$\begin{array}{r} 8\frac{7}{8} \\ 2\frac{7}{8} \\ \hline \end{array}$	$\begin{array}{r} 7\frac{5}{6} \\ 9\frac{5}{6} \\ \hline \end{array}$	$\begin{array}{r} 8\frac{7}{24} \\ 6\frac{17}{24} \\ \hline \end{array}$	$\begin{array}{r} 16\frac{1}{10} \\ 3\frac{9}{10} \\ \hline \end{array}$

- How many halves make a whole? How many fourths make a whole? How many thirds make a whole?
- If you have five half-pears, how many pears do you have? How many halves are left over?
- Ralph has 7 half-dollars. How many dollars does he have?
- Alice has 12 quarters. How many dollars does she have?
- Jean cut sandwiches into thirds. She had 9 thirds. How many sandwiches did she cut into thirds?

Practicing Division

Copy the examples below. Divide, and check your work.

Set I

- | A | B | C | D | E |
|-----------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. $35 \overline{)1960}$ | $52 \overline{)2395}$ | $44 \overline{)3592}$ | $43 \overline{)3526}$ | $75 \overline{)5337}$ |
| 2. $16 \overline{)346}$ | $64 \overline{)1802}$ | $35 \overline{)1900}$ | $11 \overline{)528}$ | $25 \overline{)1179}$ |
| 3. $23 \overline{)\$18.86}$ | $97 \overline{)\$70.81}$ | $54 \overline{)\$34.10}$ | $73 \overline{)\$67.28}$ | $82 \overline{)\$55.08}$ |
| 4. $77 \overline{)6178}$ | $69 \overline{)6723}$ | $58 \overline{)2105}$ | $87 \overline{)2461}$ | $49 \overline{)2807}$ |

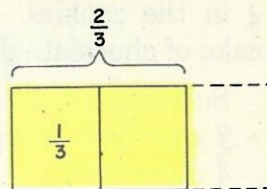
Set II

- | | | | | |
|---------------------------|------------------------|------------------------|------------------------|------------------------|
| 1. $72 \overline{)52128}$ | $91 \overline{)22932}$ | $32 \overline{)22789}$ | $43 \overline{)39305}$ | $84 \overline{)76796}$ |
| 2. $62 \overline{)25358}$ | $26 \overline{)18336}$ | $52 \overline{)16068}$ | $61 \overline{)43252}$ | $95 \overline{)19398}$ |
| 3. $53 \overline{)44838}$ | $87 \overline{)69695}$ | $96 \overline{)19907}$ | $65 \overline{)18618}$ | $74 \overline{)59247}$ |
4. The auditorium in Baird School has 980 seats. There are 35 seats in each row. How many rows of seats are there in the auditorium?
5. Mr. Brown bought 564 small orange trees. He planted them in 28 equal rows. How many trees did he plant in each row? How many trees did he have left?
6. A farmer sold 65 baskets of tomatoes for \$55.25. What was the price of each basket?
7. A bushel of oats weighs 32 pounds. How many bushels are there in 192 pounds?

Subtracting Like Fractions

1. One day Miss Gibson gave Bob $\frac{2}{3}$ of a sheet of heavy yellow paper to use in making a poster. He used $\frac{1}{3}$ of the sheet. What part of the sheet did he have left?

The drawing at the right shows the two thirds of the sheet of paper that were given to Bob. He used one of the two thirds. How many thirds were left?

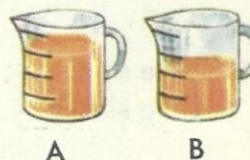


You will find that it is just as easy to subtract like fractions as it is to subtract whole numbers. You think, one-third from two-thirds leaves one-third.

$$\begin{array}{r} \frac{2}{3} \text{ or } 2 \text{ thirds} \\ \frac{1}{3} \text{ or } 1 \text{ third} \\ \hline \frac{1}{3} \text{ or } 1 \text{ third} \end{array}$$

You subtract the $\frac{1}{3}$ that Bob used from the $\frac{2}{3}$ that was given him. This leaves $\frac{1}{3}$ of the sheet of paper.

2. One morning Ruth had $\frac{3}{4}$ cup of orange juice. After she poured out $\frac{1}{4}$ cup, how much orange juice did she have left?



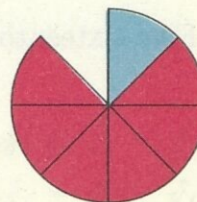
Cup A is $\frac{3}{4}$ full. Cup B shows how much Ruth had left after she had poured $\frac{1}{4}$ cup of juice into the glass. How much juice was left?

$$\begin{array}{r} \frac{3}{4} \text{ cup} \\ \frac{1}{4} \text{ cup} \\ \hline \frac{2}{4} = \frac{1}{2} \text{ cup} \end{array}$$

3 fourths - 1 fourth = ? fourths.

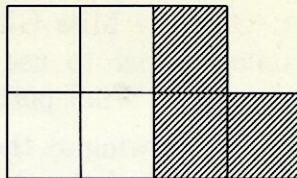
Reduce $\frac{2}{4}$ to lowest terms; $\frac{2}{4} = \frac{1}{2}$

3. The drawing at the right shows $\frac{7}{8}$ of a circle. One-eighth is colored blue. What part of the circle is red?



Practice in Subtracting Fractions

Sally and her mother were making chocolate cookies. They had $\frac{7}{8}$ of a large cake of chocolate. They used $\frac{3}{8}$ in the cookies. What part of a cake of chocolate did they have left?



Subtract $\frac{3}{8}$ from $\frac{7}{8}$.

7 eighths $-$ 3 eighths $=$? eighths.

4 eighths $=$? half.

$$\begin{array}{r} \frac{7}{8} \\ - \frac{3}{8} \\ \hline \frac{4}{8} = \frac{1}{2} \end{array}$$

What part of the cake of chocolate was left? Does the picture above show that the remainder is correct?

Read these statements and supply the missing numbers:

1. Seven marbles $-$ 5 marbles $=$? marbles.

Seven eighths $-$ 5 eighths $=$? eighths.

$$\frac{7}{8} - \frac{5}{8} = \frac{2}{8}, \text{ or } \frac{1}{4}$$

2. Five apples $-$ 1 apple $=$? apples.

Five sixths $-$ 1 sixth $=$? sixths.

$$\frac{5}{6} - \frac{1}{6} = \frac{4}{6}, \text{ or } \frac{2}{3}$$

Copy the following examples and subtract:

3. Four fifths $-$ 2 fifths $=$? fifths.

$$\frac{4}{5} - \frac{2}{5} = \frac{2}{5}$$

4. Eleven twelfths $-$ 5 twelfths $=$? twelfths.

$$\frac{11}{12} - \frac{5}{12} = \frac{6}{12}, \text{ or } \frac{1}{2}$$

5. Five sixteenths $-$ 1 sixteenth $=$? sixteenths.

$$\frac{5}{16} - \frac{1}{16} = \frac{4}{16}, \text{ or } \frac{1}{4}$$

6. $\frac{7}{10} - \frac{3}{10} = \frac{4}{10}, \text{ or } \frac{2}{5}$

8. $\frac{5}{12} - \frac{1}{12} = \frac{4}{12}, \text{ or } \frac{1}{3}$

7. $\frac{7}{16} - \frac{5}{16} = \frac{2}{16}, \text{ or } \frac{1}{8}$

9. $\frac{7}{12} - \frac{1}{12} = \frac{6}{12}, \text{ or } \frac{1}{2}$

Practice in Subtracting Fractions

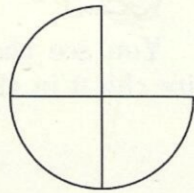
Copy and subtract. Each answer should be in lowest terms.

	A	B	C	D	E	F
1.	$\frac{5}{6} - \frac{1}{6}$	$\frac{5}{7} - \frac{3}{7}$	$\frac{3}{10} - \frac{1}{10}$	$\frac{2}{5} - \frac{1}{5}$	$\frac{7}{12} - \frac{5}{12}$	$\frac{3}{4} - \frac{1}{4}$
2.	$\frac{7}{18} - \frac{5}{18}$	$\frac{9}{16} - \frac{3}{16}$	$\frac{4}{5} - \frac{2}{5}$	$\frac{3}{16} - \frac{1}{16}$	$\frac{11}{24} - \frac{5}{24}$	$\frac{8}{15} - \frac{2}{15}$
3.	$\frac{7}{9} - \frac{4}{9}$	$\frac{17}{24} - \frac{5}{24}$	$\frac{7}{15} - \frac{1}{15}$	$\frac{7}{9} - \frac{1}{9}$	$\frac{7}{16} - \frac{3}{16}$	$\frac{6}{7} - \frac{1}{7}$

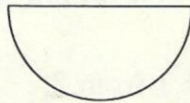
4. Helen had a piece of silk $\frac{5}{8}$ yd. long. She used $\frac{3}{8}$ yd. to make a doll's dress. How much silk did she have left?
5. John knew that the 3 plums he had were $\frac{3}{12}$ of a dozen. If he gave 1 plum to his brother, what part of a dozen did he give his brother? What part of a dozen did he have left?
6. When Sally was ready to serve pie at dinner, she found that the pie had been cut into sixths, and that $\frac{5}{6}$ of the pie was on the plate. She served 3 of the pieces, or $\frac{3}{6}$. What part of the pie was left?
7. Jack spent $\frac{3}{4}$ of an hour raking leaves and $\frac{1}{4}$ hour sweeping the sidewalk. How much longer did he spend raking leaves than sweeping the walk?
8. What part of each figure is not shown in the drawings?



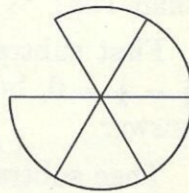
A



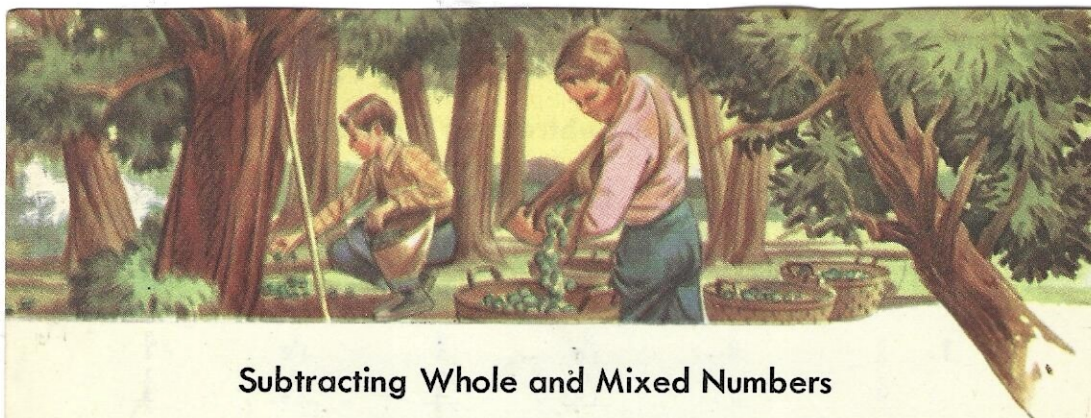
B



C



D



Subtracting Whole and Mixed Numbers

1. In the fall David and Paul gathered $3\frac{1}{2}$ bushels of walnuts. They sold 2 bushels. How many bushels of walnuts did they have left? $3\frac{1}{2} - 2 = ?$

As there is no fraction to subtract from $\frac{1}{2}$, write $\frac{1}{2}$ in the answer. Subtract 2 from 3. Write 1 in the answer.

$$\begin{array}{r} 3\frac{1}{2} \text{ bushels} \\ - 2 \\ \hline 1\frac{1}{2} \text{ bushels} \end{array}$$

The boys had $1\frac{1}{2}$ bushels of walnuts left.

2. Marie baked $4\frac{3}{4}$ dozen cookies. She took $3\frac{1}{4}$ dozen to school for a class party. How many cookies did she have left?

Subtract the fractions: $\frac{3}{4} - \frac{1}{4} = ?$
 Subtract the whole numbers: $4 - 3 = ?$
 Change $1\frac{2}{4}$ to $1\frac{1}{2}$ by reducing $\frac{2}{4}$ to $\frac{1}{2}$.

$$\begin{array}{r} 4\frac{3}{4} \text{ dozen} \\ - 3\frac{1}{4} \\ \hline 1\frac{2}{4} = 1\frac{1}{2} \text{ dozen} \end{array}$$

Marie had $1\frac{1}{2}$ dozen cookies left.

3. During vacation James spent $2\frac{1}{2}$ months in the country. His younger brother, Ted, was there only $1\frac{1}{2}$ months. How much more time did James spend in the country than Ted?

First subtract the fractions. You see that $\frac{1}{2} - \frac{1}{2} = 0$, but you do not write the 0 in the answer.

$$\begin{array}{r} 2\frac{1}{2} \text{ months} \\ - 1\frac{1}{2} \\ \hline 1 \text{ month} \end{array}$$

Then subtract 1 from 2.

James spent 1 month more in the country than Ted.

► When the difference between two fractions is zero, do not write the zero in the answer.

4. Study the examples below. Then copy the examples and subtract. Compare your work with the work in the book.

$$\begin{array}{r} 8\frac{1}{2} \\ 2 \\ \hline 6\frac{1}{2} \end{array}$$

$$\begin{array}{r} 6\frac{3}{5} \\ 2\frac{2}{5} \\ \hline 4\frac{1}{5} \end{array}$$

$$\begin{array}{r} 9\frac{5}{6} \\ 4\frac{5}{6} \\ \hline 5 \end{array}$$

$$\begin{array}{r} 7\frac{5}{12} \\ \frac{1}{12} \\ \hline 7\frac{4}{12} = 7\frac{1}{3} \end{array}$$

$$\begin{array}{r} 9\frac{5}{6} \\ 4\frac{1}{6} \\ \hline 5\frac{4}{6} = 5\frac{2}{3} \end{array}$$

Copy the examples below and subtract. If necessary, reduce the fractions in the answers to lowest terms.

	A	B	C	D	E
5.	$\begin{array}{r} 7\frac{4}{5} \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 5\frac{2}{3} \\ 2\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 9\frac{3}{4} \\ 7\frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} 10\frac{3}{5} \\ 5\frac{1}{5} \\ \hline \end{array}$	$\begin{array}{r} 12\frac{3}{4} \\ 2\frac{1}{4} \\ \hline \end{array}$
6.	$\begin{array}{r} 16\frac{1}{2} \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 15\frac{5}{6} \\ 9\frac{5}{6} \\ \hline \end{array}$	$\begin{array}{r} 8\frac{5}{8} \\ 1\frac{3}{8} \\ \hline \end{array}$	$\begin{array}{r} 11\frac{5}{6} \\ 7\frac{1}{6} \\ \hline \end{array}$	$\begin{array}{r} 15\frac{1}{2} \\ 6 \\ \hline \end{array}$
7.	$\begin{array}{r} 9\frac{7}{8} \\ 4\frac{1}{8} \\ \hline \end{array}$	$\begin{array}{r} 16\frac{7}{12} \\ 7\frac{5}{12} \\ \hline \end{array}$	$\begin{array}{r} 14\frac{7}{10} \\ 8\frac{3}{10} \\ \hline \end{array}$	$\begin{array}{r} 12\frac{1}{3} \\ 5\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 18\frac{7}{24} \\ 9\frac{1}{24} \\ \hline \end{array}$
8.	$\begin{array}{r} 21\frac{11}{16} \\ 17\frac{7}{16} \\ \hline \end{array}$	$\begin{array}{r} 14\frac{2}{5} \\ 6\frac{2}{5} \\ \hline \end{array}$	$\begin{array}{r} 19\frac{11}{15} \\ 7\frac{2}{15} \\ \hline \end{array}$	$\begin{array}{r} 20\frac{9}{24} \\ 12\frac{11}{24} \\ \hline \end{array}$	$\begin{array}{r} 26\frac{3}{5} \\ 18\frac{2}{5} \\ \hline \end{array}$

Copy and subtract:

9. $9\frac{7}{8} - 3\frac{3}{8} = ?$

13. $10\frac{5}{16} - 6\frac{5}{16} = ?$

10. $12\frac{5}{8} - 8\frac{5}{8} = ?$

14. $9\frac{15}{24} - 7\frac{11}{24} = ?$

11. $15\frac{5}{9} - 6\frac{2}{9} = ?$

15. $20\frac{2}{3} - 14\frac{2}{3} = ?$

12. $11\frac{2}{7} - 5 = ?$

16. $18\frac{7}{15} - 11\frac{4}{15} = ?$

Understanding Fractions

1. What is the denominator in the fraction $\frac{4}{5}$? Tell what it shows.
2. What is the numerator in the fraction $\frac{4}{5}$? What does it mean?
3. What do we mean by the "terms" of a fraction?
4. Why are $\frac{3}{8}$ and $\frac{7}{8}$ called "like fractions"? Name two other like fractions.
5. Give another fraction that has the same value as $\frac{1}{2}$; as $\frac{1}{4}$; as $\frac{1}{3}$.
6. What is a proper fraction? an improper fraction? Give an example of each.
7. What is a mixed number? Give an example.
8. When is a fraction reduced to lowest terms?
9. Name a fraction which shows that something is divided into eight equal parts.
10. Which of the following fractions are proper fractions?
 $\frac{1}{6}$ $\frac{9}{8}$ $\frac{5}{9}$ $\frac{6}{4}$ $\frac{8}{5}$ $\frac{12}{10}$ $\frac{3}{4}$ $\frac{5}{12}$ $\frac{3}{3}$
11. Read the improper fractions in Example 10.
12. Which of the following numbers are mixed numbers?
 $6\frac{1}{2}$ 5 $1\frac{1}{3}$ $4\frac{2}{5}$ 7 2
13. Change these improper fractions to whole or mixed numbers: $\frac{8}{4}$, $\frac{6}{5}$, $\frac{5}{2}$, $\frac{8}{8}$.

KEEPING ON YOUR TOES

1. Six-eighths of an inch is the same as ? fourths of an inch.
2. One-half mile is equal to ? quarters of a mile.
3. How many thirds can Alice cut from 2 melons?
4. Write a fraction that is larger than $\frac{1}{6}$ and smaller than $\frac{1}{4}$.

Making Sure of Addition of Fractions

Here are some examples to test how well you can add like fractions. Be sure that the fraction in each answer is in lowest terms.

If you make mistakes, turn to the pages listed at the right of the rows. Studying and working these examples again will help you.

	A	B	C	D	E	
1.	$\frac{1}{3}$ $\frac{1}{3}$ 	$\frac{3}{5}$ $\frac{1}{5}$ 	$\frac{5}{9}$ $\frac{2}{9}$ 	$\frac{1}{5}$ $\frac{1}{5}$ 	$\frac{1}{7}$ $\frac{3}{7}$ 	191 192
2.	$\frac{1}{4}$ $\frac{1}{4}$ 	$\frac{1}{8}$ $\frac{3}{8}$ 	$\frac{5}{12}$ $\frac{1}{12}$ 	$\frac{1}{10}$ $\frac{3}{10}$ 	$\frac{1}{9}$ $\frac{2}{9}$ 	193
3.	$\frac{3}{4}$ $\frac{3}{4}$ 	$\frac{5}{18}$ $\frac{17}{18}$ 	$\frac{4}{5}$ $\frac{3}{5}$ 	$\frac{7}{16}$ $\frac{11}{16}$ 	$\frac{17}{24}$ $\frac{11}{24}$ 	197 198
4.	$\frac{9}{16}$ $\frac{7}{16}$ 	$\frac{1}{10}$ $\frac{9}{10}$ 	$\frac{11}{24}$ $\frac{13}{24}$ 	$\frac{5}{8}$ $\frac{3}{8}$ 	$\frac{1}{4}$ $\frac{3}{4}$ 	199
5.	$3\frac{1}{5}$ $\frac{1}{5}$ 	$6\frac{1}{8}$ $\frac{1}{8}$ 	$\frac{1}{9}$ 5 $\frac{4}{9}$ 	$\frac{7}{8}$ $\frac{1}{8}$ 4 	8 $\frac{1}{12}$ $\frac{7}{12}$ 	201
6.	$5\frac{1}{8}$ $2\frac{3}{8}$ 	$6\frac{4}{9}$ $3\frac{4}{9}$ 	$5\frac{3}{5}$ $4\frac{1}{5}$ 	$8\frac{5}{12}$ $3\frac{5}{12}$ 	$12\frac{3}{16}$ $14\frac{5}{16}$ 	202
7.	$7\frac{4}{5}$ $5\frac{3}{5}$ 	$5\frac{5}{8}$ $6\frac{5}{8}$ 	$9\frac{5}{6}$ $3\frac{1}{6}$ 	$6\frac{7}{12}$ $2\frac{7}{12}$ 	$7\frac{3}{10}$ $4\frac{7}{10}$ 	204

Making Sure of Subtraction of Fractions

The examples below will show how well you can subtract like fractions. Be sure that all fractions in the answers are in lowest terms.

If you need help, turn to the pages listed.

	A	B	C	D	E	F	
1.	$\frac{2}{3}$ $\frac{1}{3}$ —	$\frac{4}{5}$ $\frac{1}{5}$ —	$\frac{7}{8}$ $\frac{5}{8}$ —	$\frac{5}{6}$ $\frac{1}{6}$ —	$\frac{7}{12}$ $\frac{1}{12}$ —	$\frac{7}{10}$ $\frac{3}{10}$ —	208 209
2.	$10\frac{3}{10}$ 4 —	$8\frac{3}{5}$ $5\frac{2}{5}$ —	$6\frac{5}{8}$ $2\frac{1}{8}$ —	$7\frac{5}{12}$ $2\frac{1}{12}$ —	$12\frac{7}{8}$ 7 —	$9\frac{5}{6}$ $2\frac{1}{6}$ —	210 211

KEEPING ON YOUR TOES

1. Write the letters that are used to write all the Roman numbers from 1 to 100.

2. Write Arabic numbers for the following:

IX XV XXIV L XL XLV

3. Write Roman numbers for the following:

6 17 28 34 41 50
63 79 82 90 95 100

4. What is the largest number you can write with three figures? with four figures? six figures? seven figures?

5. Which is the largest of the following numbers?

1,028,000 1,009,898 1,100,000

6. What is the place value of each 7 in 7,127,270?

7. What do the zeros show in the number 8,006?

8. Write the following number in figures: two million, eight hundred thousand, ten.



Using Fractions in Problems

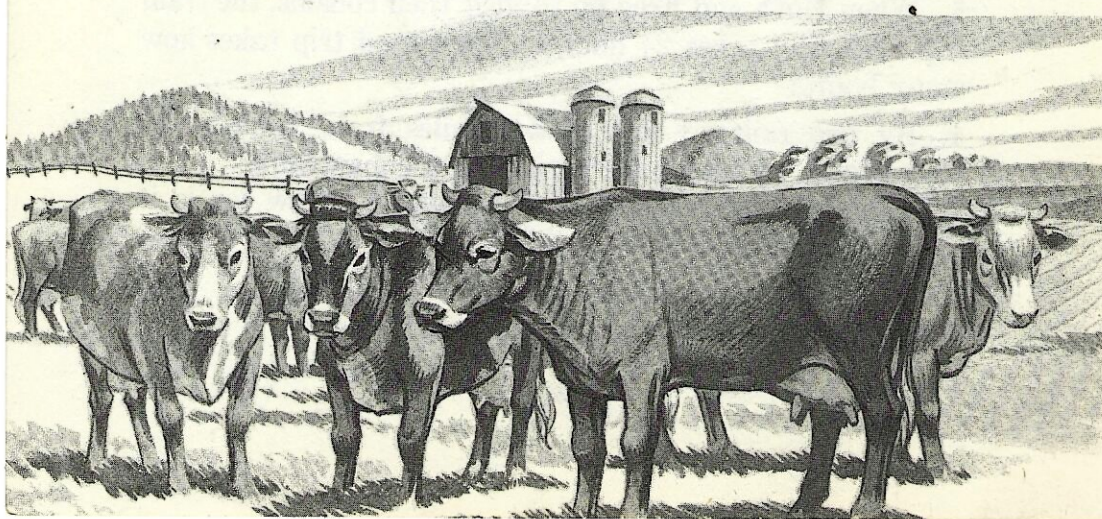
Read each problem carefully. Think what it tells you. Then answer the question asked.

1. In 1927 a coast-to-coast plane trip took $31\frac{3}{4}$ hours. In 1933 the trip took only $19\frac{3}{4}$ hours. By how many hours had the time been reduced?
2. In 1937 a trip by plane across the United States took $15\frac{3}{4}$ hours. In 1950 the trip was made in 12 hours. What was the difference in time required?
3. Mr. Adams made a trip of $2\frac{3}{4}$ hours by plane. It took him $1\frac{3}{4}$ hours in all to go to and from the airports. How much time did he spend traveling?
4. Mr. Foster made a round trip by plane from Chicago to New York. The trip to New York took 3 hours. The return trip was made in $3\frac{1}{2}$ hours. How many hours did he spend traveling? How much longer did it take to go from New York to Chicago than from Chicago to New York?
5. When Ruth and Fred go to visit their cousins, the train trip each way takes $2\frac{1}{4}$ hours. The round trip takes how many hours?
6. By one railroad it is $907\frac{7}{10}$ miles from Chicago to New York, by way of Harrisburg, Pennsylvania. It is $713\frac{1}{10}$ miles from Chicago to Harrisburg. How far is it from Harrisburg to New York?
7. A bus travels between two cities in $1\frac{1}{2}$ hours. How much time is required for a round trip?

What Process Should You Use?

Read and think about each problem. The question asked will help you decide what **process** to use, that is, whether to add, subtract, multiply, or divide.

1. Henry sold a hog that weighed 225 pounds. How much did he receive for the hog, at 19 cents a pound?
2. Henry had already saved \$15.50. After the sale of the hog how much money did he have in all?
3. He wanted to buy a pony that cost \$125. How much more money did he need to buy the pony?
4. Henry had 12 lambs, weighing 420 pounds in all. What was the average weight of the lambs?
5. Henry's father sold one riding horse for \$350 and another for \$475. How much did he receive for both horses?
6. On the farm where Henry lives, they raised 3375 bushels of corn in one year and 1500 bushels of oats. How many more bushels of corn were raised than of oats?
7. Six hundred bushels of oats were sold for 85 cents a bushel. How much was received for the oats?
8. Henry's father bought 18 dairy cows. If he paid a total of \$5310, what was the average price of the cows?



Keeping in Practice

Set I

Copy, work, and check:

1. $5463 - 897 = ?$

4. 47 times 68 = ?

2. $2118 \div 26 = ?$

5. $1000 \div 38 = ?$

3. $2500 \div 35 = ?$

6. $1912 \div 51 = ?$

7. Add:

8. Subtract:

9. Multiply:

$$\begin{array}{r} \$19.50 \\ 3.75 \\ 6.48 \\ \hline 75.90 \end{array}$$

$$\begin{array}{r} \$50.00 \\ 28.35 \\ \hline \end{array}$$

$$\begin{array}{r} 725 \\ 308 \\ \hline \end{array}$$

10. Find the difference between \$90.45 and \$28.78.

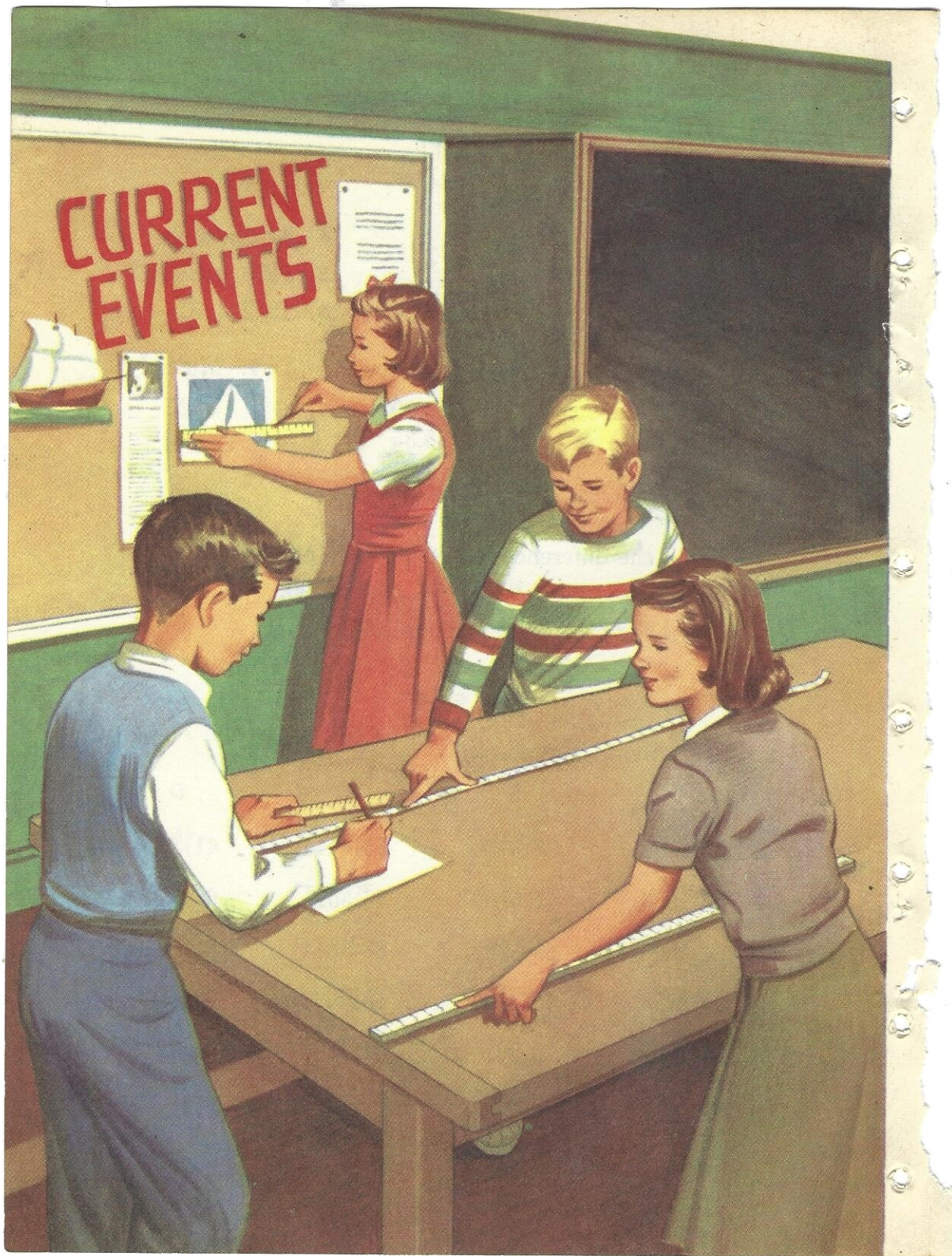
11. Find the sum of 48, 85, 79, 68, and 90.

12. Find the product of 4268 and 54.

Set II

Copy, divide, and check:

A	B	C	D
1. $27 \overline{)1885}$	$38 \overline{)3430}$	$55 \overline{)4444}$	$41 \overline{)3343}$
2. $57 \overline{)1653}$	$61 \overline{)5100}$	$73 \overline{)5511}$	$66 \overline{)1300}$
3. $86 \overline{)5200}$	$99 \overline{)3767}$	$88 \overline{)3344}$	$96 \overline{)1450}$
4. $29 \overline{)2798}$	$45 \overline{)2890}$	$68 \overline{)4692}$	$59 \overline{)3666}$
5. $53 \overline{)39888}$	$76 \overline{)20100}$	$81 \overline{)23947}$	$94 \overline{)15713}$
6. $91 \overline{)56371}$	$28 \overline{)8432}$	$39 \overline{)14508}$	$86 \overline{)13291}$



LEARNING MORE ABOUT MEASURES

Different Ways of Measuring

All measures have large and small units. A **unit** is *one* of any kind. When we say a board is 3 feet long, we are using the foot as the unit of measure. A piece of notebook paper is 8 inches wide; here the inch is the unit of measure.

The unit of measure that we use depends on what we want to measure. What unit of measure should you use to measure the width of your book? the width of your desk? the length of a blackboard?

Use a foot ruler to measure the length of the blackboard. Next, measure it with a yardstick, and then with a tape measure. Are all three of the measurements the same? Which do you think is the most accurate way to measure this length? Why?

$$1 \text{ yard} = 3 \text{ feet} = 36 \text{ inches}$$

1. Measure the length and width of your classroom. Find out whether different ways of measuring this distance are equally accurate.
2. Measure the length and width of your desk.
3. Without using a ruler, draw a line which you think is 8 inches long. Measure the line. How close was your estimate?
4. Draw a line on the blackboard that you think is a yard long. Measure the line. Is it too long? too short?

Measuring Greater Distances

Harold said, "When we went from Chicago to Buffalo we rode 525 miles on the train."

Do you know what a mile is? Name a place which you think is about a mile from your home or school.

There are 5,280 feet in a mile. How can you find the number of yards in a mile?

$$1 \text{ mile} = 1,760 \text{ yards} = 5,280 \text{ feet}$$

1. An airplane is flying at a height, or altitude, of 5,000 feet. Is this more, or less, than a mile? How much more, or less?
2. When an airplane is flying at an altitude of 10,000 feet, is the altitude of the plane more, or less, than 2 miles? How much more, or less?
3. In the town near Tom's home, there are 8 blocks in a mile. Then each block is what part of a mile? How many feet are there in each block? how many yards?
4. Find out how many blocks make a mile in the town or city in which you live, or near which you live.
5. Tom can walk a mile in 20 minutes. How long will it take him to walk $\frac{1}{2}$ mile? $\frac{1}{4}$ mile? 2 miles? 4 miles?
6. A football field is 100 yards in length from goal line to goal line. This is how many feet?

$$1 \text{ rod} = 5\frac{1}{2} \text{ yards} = 16\frac{1}{2} \text{ feet}$$

$$1 \text{ mile} = 320 \text{ rods}$$

7. Farmers often use the rod as a unit of measure. A farmer may say, "This field is 40 rods wide and 80 rods long."

In your classroom, mark off $16\frac{1}{2}$ feet. This shows the length of a rod. How many rods are there in 1 mile?



Changing Measures of Length

1. In a museum of natural history, Joan saw an American eagle that measured 7 feet from wing tip to wing tip. What is the eagle's wingspread in inches?

Since $1 \text{ ft.} = 12 \text{ in.}$, $7 \text{ ft.} = 7 \times 12 \text{ in.}$, or $\underline{\quad ? \quad} \text{ in.}$

2. How many inches in 3 feet? in 5 feet?
3. Joan also saw a giraffe at the museum. The sign told her it measured 72 inches from the shoulders to the crown of its head. This is how many feet?

To change 72 inches to feet, divide 72 by 12. Why do you divide by 12? $72 \text{ in.} = \underline{\quad ? \quad} \text{ ft.}$

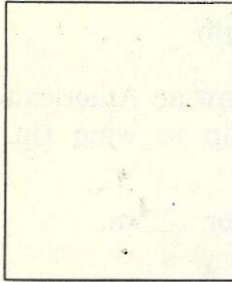
4. How many feet in 48 inches? in 60 inches?
5. Which is the larger unit of measure, a foot or an inch? a foot or a yard? an inch or a yard?

Find the answers to the following problems:

6. On the golf course John's father drove a ball 212 yards. How many feet did he drive the ball?
7. Bob is 4 feet and 2 inches tall. What is his height in inches?
8. In some towns there are 10 blocks in a mile. One-tenth mile equals how many feet? $5,280 \div 10 = ?$
9. To change large units of measure to smaller units, do you multiply or divide? Why?
10. To change small units of measure to larger units do you multiply or divide? Why?

Making a Rabbit Pen

1. Henry and Paul are planning to make a wire pen for their rabbits. First they drew a picture of the pen, showing how long and how wide they were going to make it.



To know how much wire netting to buy, the boys had to find the distance around the pen.

6 ft. Henry said, "Since the pen is to be 5 feet wide, we shall need 10 feet for the two short sides."

Paul said, "If the pen is 6 feet long, the two long sides will take 12 feet."

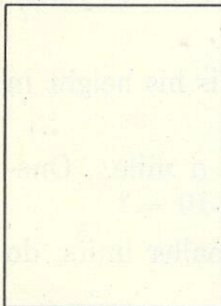
5 ft.

They added 10 feet and 12 feet, and found that they would need 22 feet of wire netting for the sides and ends.

The rabbit pen was shaped like a rectangle.

► A **rectangle** is a figure having 4 straight sides and 4 square corners. The distance around a figure is called its **perimeter**.

What was the perimeter of the rabbit pen?



2. Fred and Ralph wanted to buy wire netting to put around their garden, which was 14 feet long and 10 feet wide. How much did they need?

Fred figured it this way:

$$2 \times 14 \text{ ft.} = 28 \text{ ft.}$$

$$2 \times 10 \text{ ft.} = 20 \text{ ft.}$$

$$28 \text{ ft.} + 20 \text{ ft.} = 48 \text{ ft.}$$

Ralph did it this way:

$$14 \text{ ft.} + 10 \text{ ft.} = 24 \text{ ft.}$$

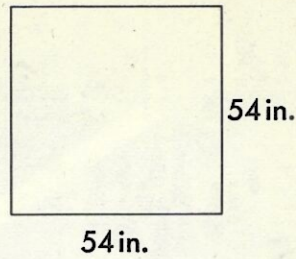
$$2 \times 24 \text{ ft.} = 48 \text{ ft.}$$

Were both right?

Finding Perimeters

1. Virginia hemmed a tablecloth for her mother. Each side was 54 inches long. How many inches was it around the cloth?

Since each side of the tablecloth was 54 inches long, the tablecloth was in the shape of a square.

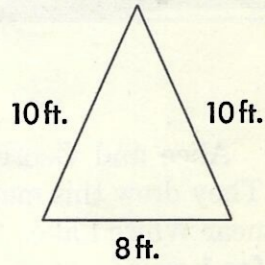


► A **square** is a rectangle whose four sides are equal.

To find the perimeter of this square cloth, you can add 54 in., 54 in., 54 in., and 54 in., or you can multiply 54 in. by 4. Which way is easier?

It was 216 inches around the cloth.

2. In Lincoln Park one flower bed is in the shape of a triangle. The bed measures 8 feet on one side and 10 feet on each of the other two sides. What is the perimeter of the bed?



► A **triangle** is a figure having three straight sides.

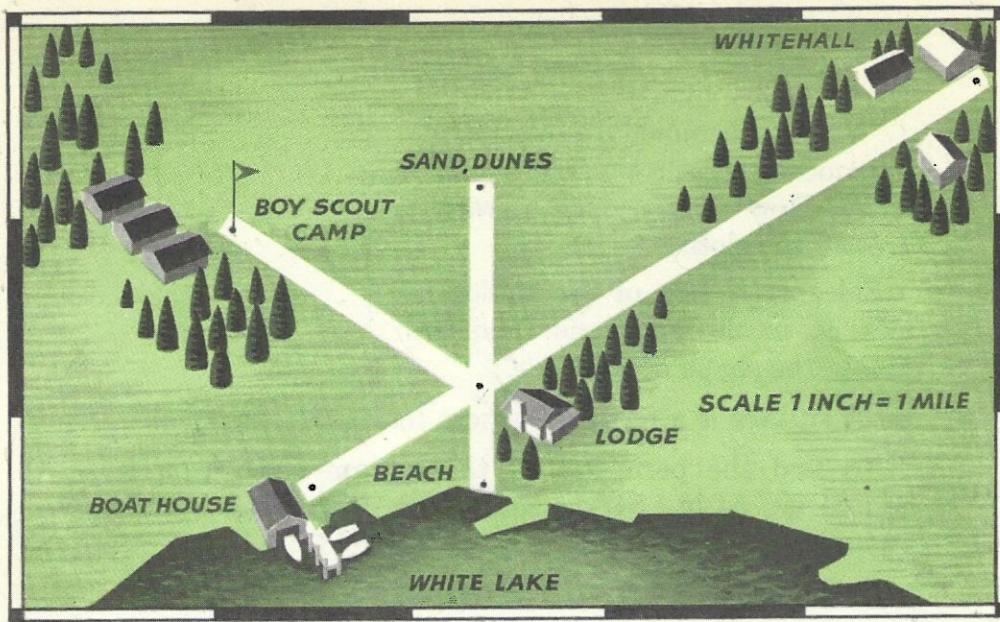
3. Find the perimeter of a room 12 feet wide and 15 feet long.

4. Mrs. Johnson is putting a binding around the edge of a quilt that is 84 inches long and 72 inches wide. How many inches of binding will she need?

5. If a paper napkin is a 12-inch square, how many inches is it around the napkin?

6. Find the perimeter of a triangle that is 15 inches on one side and 18 inches on each of the other two sides.

7. A swimming pool in the shape of a rectangle is 60 feet long and 25 feet wide. What is its perimeter?



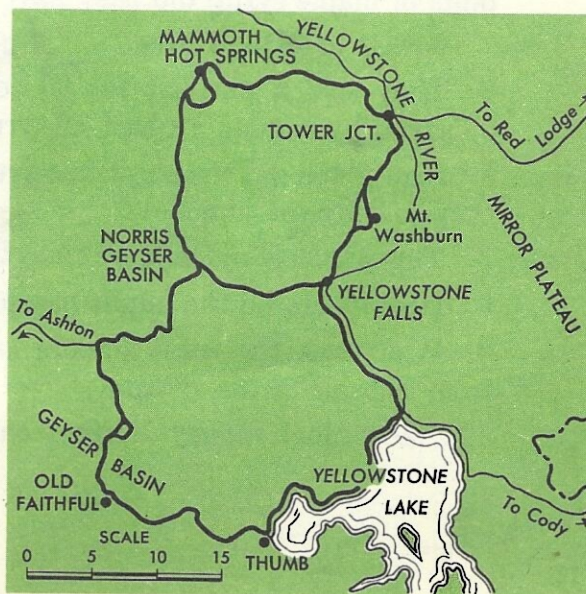
Reading a Map

Alice and George spent their vacation at White Lake. They drew this map to show the location of different places near White Lake. On their map a distance of 1 inch stands for 1 mile.

► We say the map is “drawn to scale.” Such a drawing is a **scale drawing**. The **scale** in the map above is 1 inch = 1 mile.

1. Measure the distance from the lodge to the beach. It is ? inch. That distance on the map stands for what part of a mile?
2. Every day they drove over to the town of Whitehall. How far is Whitehall from the lodge?
3. How far is it from the lodge to the nearby Boy Scout camp?
4. The sand dunes are how far from the lodge?

5. Which is farther from the lodge, the town of Whitehall or the Boy Scout camp? How much farther?
6. It is how many times as far to the sand dunes as it is to the beach?
7. It is how many times as far to the boathouse as it is to the beach?
8. Draw a map to scale, showing the location of some places in the town or city where you live.
9. Dan had a map of Kentucky and Tennessee, on which one inch equaled 22 miles. Ten inches on the map stood for how many miles?
10. The distance between 2 cities on a map is 5 inches. The scale is 1 inch = 100 miles. What is the distance in miles between the 2 cities?
11. On another map the distance between 2 cities is 4 inches. The scale is 1 inch = 200 miles. How far apart are the two cities?
12. Donald drew a map showing the best way to drive to Geneva. The route covered 5 inches on his map, which was drawn to the scale of 1 inch = 2 miles. How far away was the town of Geneva?
13. Ted brought a map of Yellowstone National Park to school. This map was drawn to the scale of 1 inch = 15 miles. Six inches on the map stood for how many miles?





Selling Maple Syrup

One spring some of the children in Central School earned money by selling maple syrup. They bought 3 gallons of maple syrup. Mrs. Shaw gave them some quart and pint jars. They put two gallons of syrup in quart jars and one gallon in pint jars.

1. How many quart jars could they fill with 2 gallons of syrup?

$$4 \text{ quarts} = 1 \text{ gallon}$$

2. They sold the syrup for \$1.75 a quart. How much did they receive for 1 gallon? for 2 gallons?

3. The pupils had paid \$6.00 a gallon for the syrup. How much did they make on 1 gallon when they sold it in quart jars? How much did they make on 2 gallons?

4. They divided the third gallon into pints. How many pints of maple syrup did they have for sale?

$$1 \text{ quart} = 2 \text{ pints}$$

$$1 \text{ gallon} = 8 \text{ pints}$$

5. They sold a pint jar for 90 cents. How much could be saved by buying a quart of syrup rather than 2 pints?

6. How much did the pupils receive for all the syrup which they sold by the pint?

7. This was how much more than they paid for 1 gallon?

8. How much did the pupils pay for the 3 gallons bought?

9. What was the total amount of money they received from the sale of the syrup?

10. How much money did they earn?

Pints, Quarts, and Gallons

1. Nancy drinks a quart of milk every day. How many glasses of milk does she drink?

1 pint = 2 cups (or 2 glasses)

2. A grown person should drink a pint of milk each day. This is how many glasses?

3. How many quarts are needed for a class of 32 children if each child is to receive a glass of milk?

4. If a cow gives 6 gallons of milk a day, how many quarts does she give?

5. Susan bought a quart and a pint of ice cream. How many pints did she buy? How much did she pay for the ice cream if it cost 90 cents a quart?

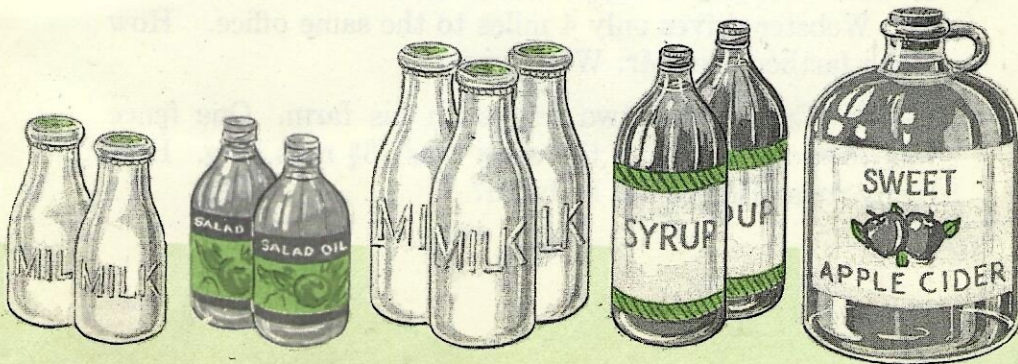
6. A large milk tank on a truck holds 2,000 gallons of milk. This is how many quarts?

7. Mrs. Sherman took 2 half-gallon jars of canned peaches to exhibit at the county fair. How many quarts was this? How many pints?

8. Mrs. Hardy bought a quart jar of strawberry preserves for 65 cents. How much did she save by buying a quart jar, instead of 2 pint jars at 35 cents each?

9. In the grocery store you see pint bottles that are of different shapes. Do they hold the same amount?

Find the quart bottles in the picture; the pint bottles. The jug holds 1 gallon or ? quarts.



Keeping in Practice

Copy and work the examples in Rows 1, 2, and 3. Be sure that the fractions in the answers are in lowest terms.

Add:

	A	B	C	D	E
1.	$6\frac{1}{4}$ <u>$4\frac{1}{4}$</u>	$3\frac{2}{3}$ <u>$5\frac{1}{3}$</u>	$2\frac{1}{8}$ <u>$7\frac{1}{8}$</u>	$8\frac{3}{8}$ <u>$1\frac{1}{8}$</u>	$9\frac{7}{8}$ <u>$4\frac{7}{8}$</u>
2.	$7\frac{4}{5}$ <u>$3\frac{2}{5}$</u>	$4\frac{1}{6}$ <u>$8\frac{1}{6}$</u>	$6\frac{7}{10}$ <u>$3\frac{3}{10}$</u>	$2\frac{1}{12}$ <u>$5\frac{7}{12}$</u>	$4\frac{5}{12}$ <u>$7\frac{11}{12}$</u>

3. Subtract:

$9\frac{7}{12}$ <u>$5\frac{5}{12}$</u>	$7\frac{7}{8}$ <u>$2\frac{1}{8}$</u>	$8\frac{9}{16}$ <u>$6\frac{5}{16}$</u>	$10\frac{11}{12}$ <u>$5\frac{1}{12}$</u>	$15\frac{5}{9}$ <u>$9\frac{2}{9}$</u>
--	--	--	--	---

4. Harold weighs $80\frac{1}{2}$ pounds. His dog weighs $18\frac{1}{2}$ pounds. How much do they weigh together?

5. James weighs $85\frac{3}{4}$ pounds. Jerry weighs $81\frac{1}{4}$ pounds. How much less does Jerry weigh than James?

6. Fred had one board $3\frac{1}{4}$ feet long and another $2\frac{1}{4}$ feet long. How many feet were there in the two pieces?

7. Jean made $4\frac{1}{3}$ dozen favors for a school party and Alice made $3\frac{2}{3}$ dozen. How many dozen favors did the two girls make?

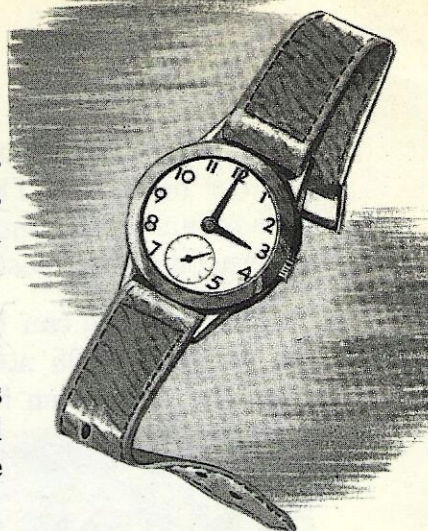
8. Mr. West drives $12\frac{7}{10}$ miles from his home to his office. Mr. Webster drives only 4 miles to the same office. How much farther does Mr. West drive?

9. Mr. Crane built two fences on his farm. One fence was $75\frac{3}{4}$ rods long, and the other was $73\frac{3}{4}$ rods long. How many rods of fence did he build?

Measuring Time

Miss Jones, the school nurse, has a watch with 3 hands on it. It has an hour hand, a minute hand, and a small hand at the bottom of the watch.

What is the small hand called? What does it show? How long does it take this hand to move around the dial? How many seconds are there in a minute?



60 seconds = 1 minute 60 minutes = 1 hour

24 hours = 1 day

1. Mary made a 3-minute announcement in the school assembly. How many seconds are there in 3 minutes?
2. It took 2 minutes and 20 seconds for everyone to leave the building during a fire drill. How many seconds did it take?
3. Thirty minutes are what part of an hour?
4. Six hours are what part of a day?
5. Susan mailed a letter on her way to school. On the mailbox a sign showed the times at which mail would be collected. Susan said, "This letter will be collected at nine ten A.M."

A.M.	P.M.
5:45	1:25
9:10	3:50
11:00	7:20
	9:25

What does A.M. mean? P.M.?

6. Mr. Moore left on the train at 11 A.M. Did he leave in the morning or in the afternoon?
7. At 2 P.M. on Saturday Betty and Joan went to a concert. Did they go in the morning or in the afternoon?

Writing Time

One day Susan wrote this message on the telephone pad for her mother: "This morning Mrs. Simmons called at five minutes past ten. She said she would call again this afternoon at half past two."

This message can be written in a shorter way. It can be written, 10:05 A.M. and 2:30 P.M. Then you would read the time, "ten five A.M." and "two thirty P.M."



What time is it by Ralph's wrist watch? This time is read, "two forty-five," for the minute hand has moved forty-five minutes *past* the hour.

How many minutes past the hour is it when the minute hand points to 5? to 8? to 11?

Another way of reading the time shown on Ralph's wrist watch is, "quarter of three," for the hour hand still has to go $\frac{1}{4}$ way around the face. We may also say, "15 minutes of three, 15 minutes to three, or 15 minutes till three."

1. Write in figures:

- | | | |
|----------------|-------------------|----------------|
| A. one fifteen | C. ten forty-five | E. three five |
| B. six thirty | D. five ten | F. six o'clock |

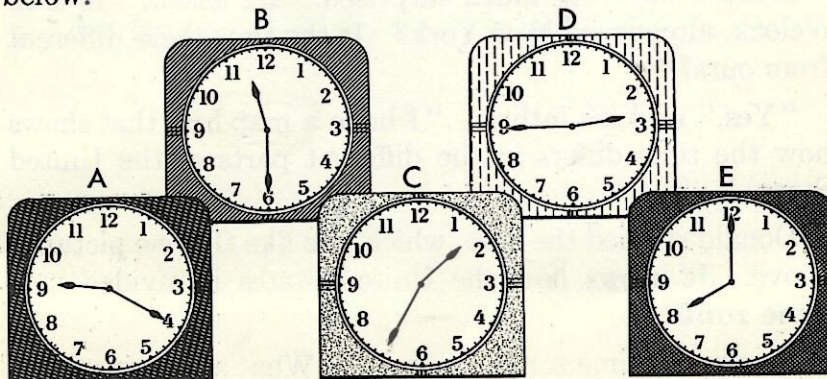
2. Draw a clockface showing the time to be 7:35.

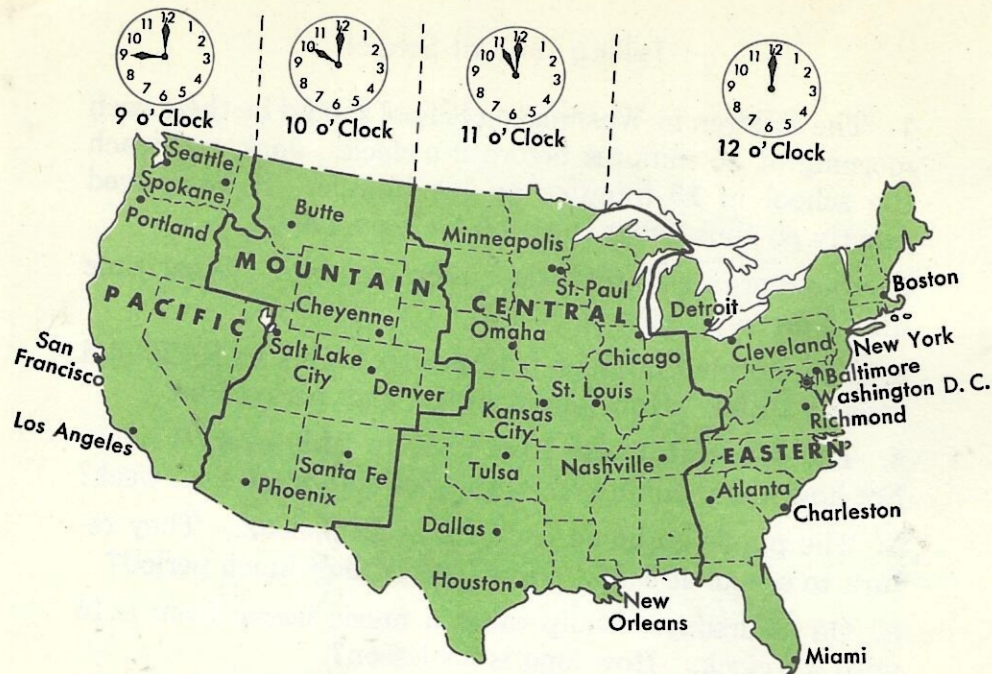
3. Write each time given below in a shorter way:

- | | |
|----------------------|-----------------------|
| A. half past seven | E. 25 minutes after 2 |
| B. 10 minutes to 8 | F. 5 minutes past 1 |
| C. 15 minutes past 3 | G. a quarter of 10 |
| D. 20 minutes of 6 | H. 25 minutes to 3 |

Telling Time at School

1. The children in Washington School should be there each morning at 15 minutes before 9 o'clock. Jack can reach the school in 15 minutes on his bicycle. If he arrived exactly on time, what time did he leave home?
2. One morning Harold was 15 minutes late. What time did he arrive at school?
3. The morning outdoor play period begins at 10:25 and ends at 10:50. How long does the play period last?
4. The glee club meets from 2:10 to 2:50 every Friday. For how many minutes does the glee club meet each week?
5. The pupils go home to lunch at 12 o'clock. They return to school at 1:15. How long is their lunch period?
6. On Thursdays, Philip takes a music lesson from 3:15 until 4 o'clock. How long is his lesson?
7. The boys' play club meets from 3:30 to 4:15 three days a week. How many hours and minutes do the boys meet each week?
8. How long does it take the hour hand to move from one number to the next on the clockface?
9. Write the time that is shown on each of the clockfaces below.





Standard Time Zones

On New Year's Eve, Donald was listening to the radio in his home in San Francisco. It was only 9 o'clock, but he heard the radio announcer say, "Happy New Year! This is New York City welcoming in the New Year."

Donald was very much surprised. He asked, "Is it 12 o'clock, already, in New York? Is the time there different from ours?"

"Yes," said his father. "I have a map here that shows how the time differs in the different parts of the United States."

Donald studied the map, which was like the one pictured above. It shows how the United States is divided into **time zones**.

How many time zones are there? What are they called?

1. The clocks on the map show what time it is in each zone when it is 9 o'clock in San Francisco. What time is it in Santa Fe? in Dallas? in Boston?
2. If you were traveling east across the United States, you would have to set your watch *forward one hour* each time you crossed a time-zone line. How many times should you reset your watch?
3. If you were traveling west, should you set your watch forward or backward?
4. In what time zone do you live?
5. If you lived in Tulsa, Oklahoma, at what time would you expect to hear a radio broadcast made in New York at 7 P.M.? When would you hear it if you lived in St. Louis?
6. If the President spoke over the radio from Washington, D. C., at 10 P.M., Eastern Standard Time, at what time would people in Chicago hear his talk? At what time would it be heard in Denver? in Seattle? in Baltimore?
7. While Mr. Corley was in New York, he called his family in New Orleans. If he made the call at 8 P.M., about what time did his family receive it?
8. Name a city where school children might be going home to lunch at about the time school starts in Los Angeles.
9. At what time would a telephone call be received in Miami, Florida, if it was made at 8 P.M. in Phoenix, Arizona?
10. Have you ever had to set your watch backward or forward while you were traveling? If so, tell the class about it.

<i>January</i>	<i>February</i>	<i>March</i>	<i>April</i>
S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
<i>May</i>	<i>June</i>	<i>July</i>	<i>August</i>
S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 4 5	S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
<i>September</i>	<i>October</i>	<i>November</i>	<i>December</i>
S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Using the Calendar

A clock tells the time of day in hours, minutes, and seconds, but the calendar tells the time in days, weeks, months, and years.

1. How many months are there in a year?
2. Name the months of the year.
3. Which months have 30 days?
4. Which months have 31 days?

5. How many days are there in this month?
6. How many days will you be in school this month?
7. February usually has how many days?
8. Leap year comes every four years. In leap year the month of February has 29 days, and the year has 366 days. 1944 was a leap year. What were the next leap years?
9. How many days are there in every year except leap year?
10. Are there more than 4 weeks in the month of January? Is this true of all the months?
11. How many weeks are there in a year? Divide 365 days by 7. How many days are left over? Divide 366 days by 7. How many extra days are there in a leap year?
12. What is the date today? What will the date be 2 weeks from today?
13. Alice went to visit her cousin on July 2. She returned one week later. On what date did she return?
14. How many days is it from December 2 until Christmas, December 25?
15. Ted's birthday comes on February 29. He was born in 1944. How many birthdays has he had since 1944?
16. Jean spent the months of July and August at camp. How many weeks was she in camp, and how many extra days?
17. Mr. Ross earns \$325 a month. What is his yearly salary?
18. Fred saves 15 cents each week. How much does he save in a year?

7 days = 1 week	52 weeks = 1 year
12 months = 1 year	365 days = 1 year
366 days = 1 leap year	

Measuring Time by Centuries

A century is 100 years. The centuries are counted from the birth of Christ. The time before Christ's birth is called B.C. (before Christ). History tells us that Rome was founded in 753 B.C. That means 753 years before the birth of Christ.

The time since the birth of Christ is called A.D. This comes from the Latin words, "Anno Domini." It means "in the year of our Lord."

The first century A.D. was the first 100 years following Christ's birth. The year 101 A.D. was the first year of the second century, which extended through 200 A.D. The third century A.D. began with the year 201 A.D. and extended through the year 300 A.D.

What was the first year of the fourth century A.D.? What was the last year of that century?

We are living in the 20th century. It began January 1, 1901, and will end December 31, 2000. What will the next century be called? With what year will it begin? When will it end?

Read Sentences 1-7. Tell in what century each year was. Then do Problems 8, 9, and 10 on page 237.

1. About 1298 Marco Polo wrote the story of his travels to China.
2. Columbus discovered America in 1492.
3. Magellan started on his voyage around the world in the year 1519.
4. The Pilgrims landed at Plymouth Rock in 1620.
5. George Washington was born in 1732.
6. Abraham Lincoln was born in 1809.
7. The Chicago World's Fair was held in 1933 and 1934.

8. The Egyptian kings began building the pyramids in about 3000 B.C. How many years before Christ's birth was that? How many centuries?

9. Jamestown, Virginia, was founded in 1607. This was early in the seventeenth century.

In what centuries were the following dates? Were they early in the century, near the middle, or late in the century?

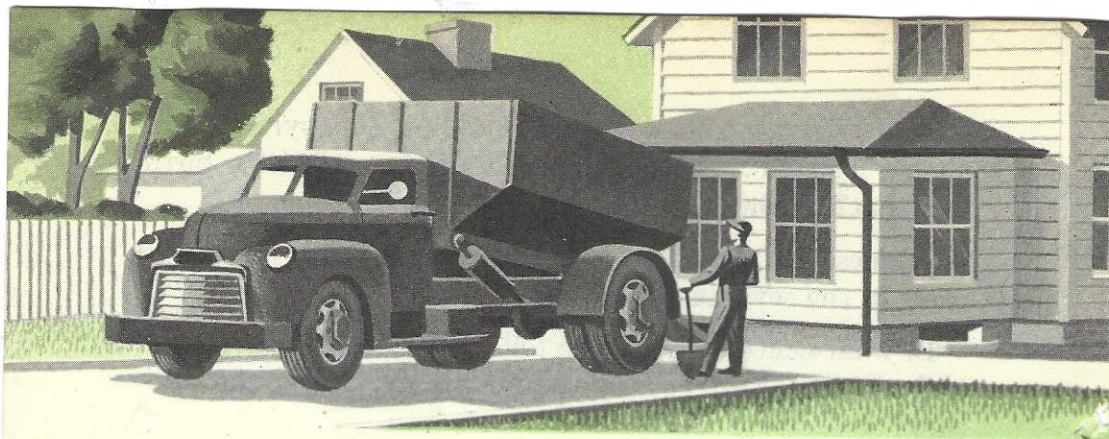
1350	1805	1480	1776	1900
1945	1682	1150	1580	1748

10. Write three sentences which give interesting dates in history. Tell in what century each date occurred.

KEEPING ON YOUR TOES

1. Which is larger, an improper or a proper fraction?
2. Write a fraction whose numerator is 9 and whose denominator is 12. Reduce the fraction to lowest terms.
3. Write a fraction that has the numerator 8 and the denominator 5. Change it to a mixed number.
4. Write a fraction that has the numerator 12 and the denominator 4. Change the fraction to a whole number.
5. What fraction with the denominator 2 equals 1? What fraction with the numerator 5 equals 1?
6. What fraction shows that one thing, or a group of things, has been divided into 6 equal parts, and that you are using 5 of the equal parts?
7. Copy the following fractions and supply the numbers that are missing:

A. $\frac{2}{3} = \frac{?}{6}$ B. $\frac{1}{4} = \frac{2}{?}$ C. $\frac{1}{2} = \frac{5}{?}$ D. $\frac{5}{6} = \frac{?}{12}$



Measures of Weight

The pound, the ounce, and the ton are units of weight. They tell how much things weigh.

1. How many ounces are there in $\frac{1}{2}$ pound of butter? how many in $\frac{1}{4}$ pound?

16 ounces = 1 pound

2000 pounds = 1 ton

2. If a pound of butter costs 68 cents, what will 8 ounces cost?

3. A box of cinnamon is labeled "Contents, 2 oz." The cinnamon weighs what part of a pound?

4. If a can of tomatoes weighs 24 ounces, how many pounds does it weigh?

5. List some things which are sold in pounds and ounces.

6. Very heavy things are measured in tons. Ted's father told him that their automobile weighed more than 2 tons. He said that a truck might weigh 4 tons or more. If a truck weighs 4 tons, how many pounds does it weigh?

7. If such a truck carries 2 tons of coal, what is the total weight, in pounds, of the truck and the coal?

8. If a bale of cotton weighs 500 pounds, how many pounds are there in 4 bales? how many tons?

9. Name some things that are sold by the ton.

Buying Fruits and Vegetables

In many places fruits and vegetables, which in the past were commonly sold by the dozen, quart, peck, or bushel, are now sold by the pound.

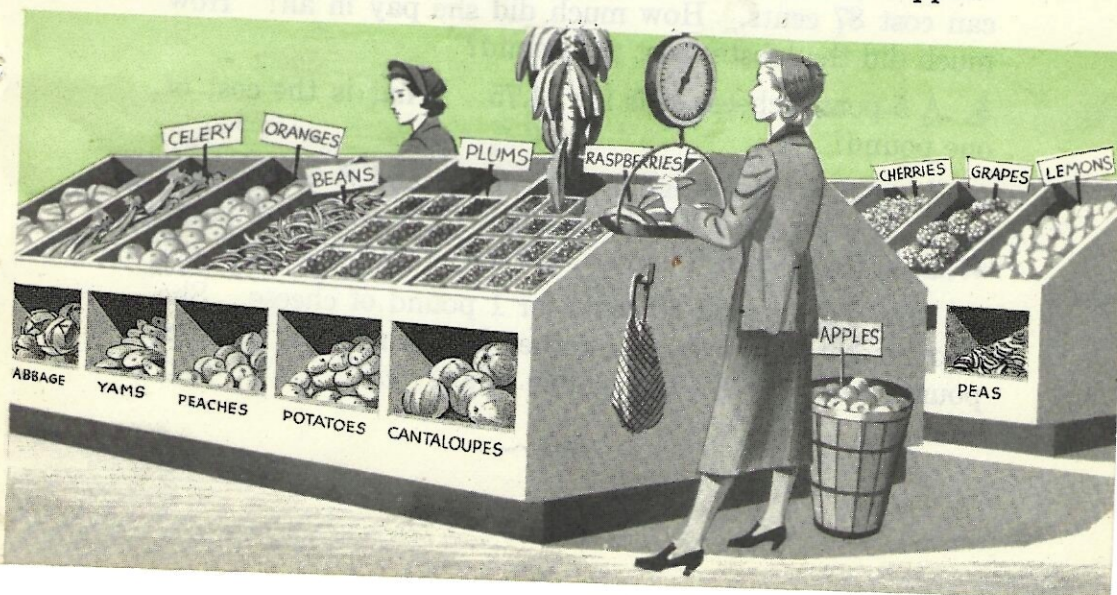
1. Bananas used to be sold by the dozen. Now they are usually sold by the pound. Which way do you think is better?
2. Oranges can be bought by count, usually by the dozen, but they are often sold by the pound. How are they sold where you live?
3. A bushel basket of apples should weigh 50 pounds. When a grocer was weighing three bushel baskets of apples, he found that one weighed 45 pounds, another $48\frac{1}{2}$ pounds, and the third 46 pounds. How do you account for the difference in the weights? Do you think it is wiser to buy a bushel basket of apples or 50 pounds of apples?
4. How is each of these things measured where you live — by count, by weight, by the bunch, or by the box, the lug, the crate, or the basket?

Potatoes
Melons
Peaches

Celery
Raspberries
Plums

Grapes
Beans
Cherries

Peas
Lemons
Apples





Pounds and Ounces

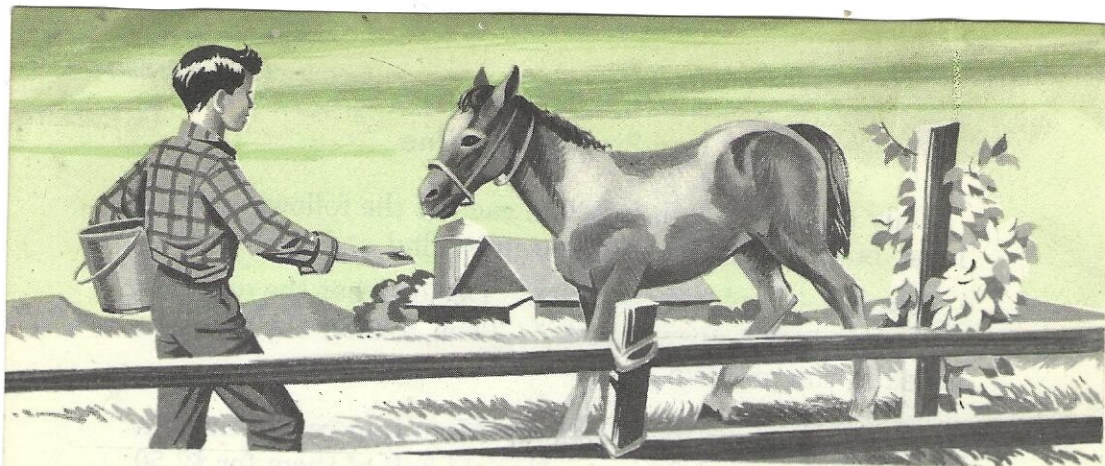
1. Mrs. Phillips bought 3 packages of frozen vegetables. Two of the packages weighed 10 ounces each. The other package weighed 12 ounces. How many pounds of frozen vegetables did she buy?
2. One pound of a certain kind of cheese costs 80 cents. What is the cost of 4 ounces?
3. How many 8-ounce pieces of cheese can be cut from a cheese weighing 10 pounds? How much will be received for the cheese if each 8-ounce piece sells for 37 cents?
4. Anne's mother bought eight 6-ounce cans of lobster meat. How many pounds of lobster did she buy? Each can cost 87 cents. How much did she pay in all? How much did the lobster cost per pound?
5. A 5-pound cheese sells for \$4.75. What is the cost of one pound? 95
6. A canned ham weighing 10 pounds and 8 ounces sells for \$1.20 a pound. What is the cost of 10 pounds of ham? What is the cost of 8 ounces? What is the total cost? 12.60
7. Mrs. Porter paid 69 cents for 1 pound of cheese. She also bought 4 ounces of another kind that cost \$1.60 a pound. How much did she pay in all? 1.09

Two Problems in One

Only one question is asked in each of the following problems, but there is another you must find and answer first.

Read each problem carefully. Decide what the question is that you must answer first. Then, answer the question asked in the problem.

1. A wood carver in the Smoky Mountain region made a dozen small animal figures. He sold half of them for \$2.50 each. How much did he receive for one-half the figures?
2. He also sold 8 pairs of hand-carved book ends for \$3.75 a pair, and a large wooden tray for \$5.50. How much did he receive for the book ends and the tray?
3. Jane visited a craft shop and bought two dolls made by the mountaineers. She paid \$3.00 for one, and \$1.75 for a smaller one. How much change did she receive from a ten-dollar bill?
4. Jane's mother bought two handmade chairs which cost \$16.95 each. She also bought a footstool for \$7.50. How much did she pay in all?
5. A clerk sold 14 hand-woven scarves in one day, and 10 the next day. He received \$70.80 from these sales. What was the average price received for the scarves?
$$\begin{array}{r} 4.20 \\ 3.50 \\ \hline 7.70 \end{array}$$
6. At a silver shop Ruth bought a pin for \$1.25, and a ring for \$2.95. Her sister paid \$3.50 for a silver bracelet. Ruth spent how much more than her sister?
7. Ruth bought post cards showing views of the Smoky Mountains. If 3 cards cost 10 cents, how much did she pay for a dozen cards?



Bushels and Pecks

Ralph feeds his colt 4 quarts of oats a day. When Ralph measures the oats, he uses a quart measure. When Ralph buys oats for his colt, he buys by the bushel. Sometimes Ralph uses a peck measure to measure the oats for his colt.

There are 8 quarts in a peck and 4 pecks in a bushel. In the United States, the dry quart is a little larger than the liquid quart. In Canada, they are equal.

$$\begin{array}{l} 2 \text{ pints} = 1 \text{ quart} \qquad 8 \text{ quarts} = 1 \text{ peck} \\ 4 \text{ pecks} = 1 \text{ bushel} \end{array}$$

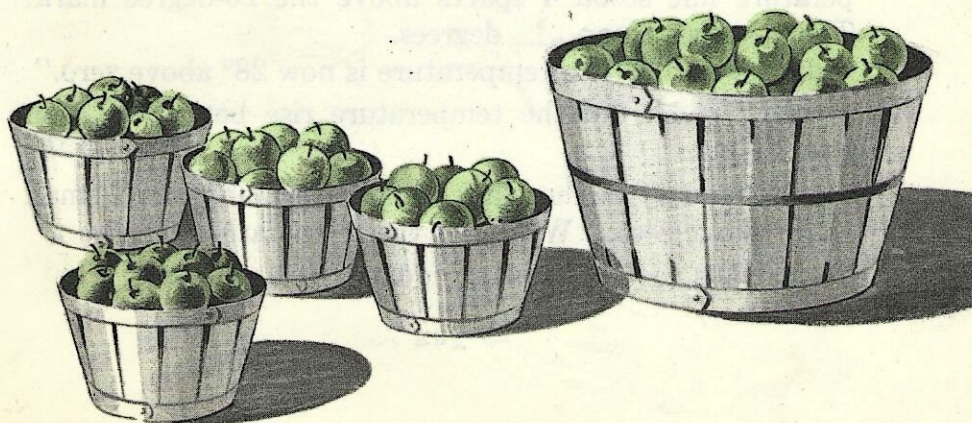
1. If Ralph's colt eats 4 quarts of oats a day, in how many days will the colt eat a bushel of oats?
2. His father's horse eats 8 quarts of oats a day. How many days will it take the horse to eat a bushel of oats?
3. John had a peck of black walnuts. What part of a bushel did he have?
4. A bushel of potatoes weighs 60 pounds. Mrs. Ford bought $\frac{1}{2}$ bushel. How many pounds of potatoes did she buy? how many pecks?
5. If 5 pounds of potatoes sell for 29 cents, what will be the cost of one peck?

Using Bushels and Pecks

You have learned that bushels of different things do not weigh the same amount. The following list gives some of the bushel weights that are standard in many states:

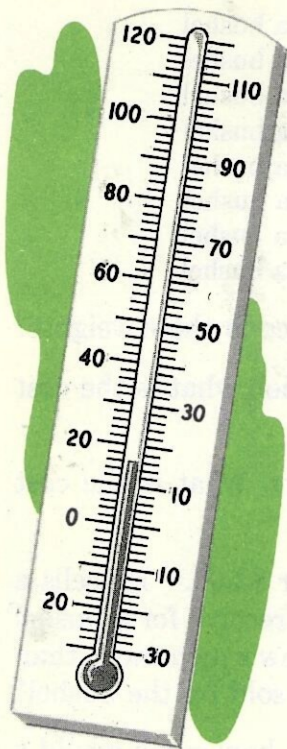
Shelled corn	56 pounds a bushel
Barley	48 pounds a bushel
Oats	32 pounds a bushel
Apples	50 pounds a bushel
Peas	60 pounds a bushel
Wheat	60 pounds a bushel
Rye	56 pounds a bushel
Potatoes	60 pounds a bushel

1. How do you account for the difference in these weights?
2. If black walnuts sell at \$3.60 a bushel, what is the cost of 1 peck?
3. If 2 pounds of peas sell for 29 cents, what is the cost of one peck? of one bushel?
4. A farmer sells a bushel of apples for \$3.00. He sells a peck for 85 cents. How much does he receive for a bushel of apples sold by the peck? This is how much more than the \$3.00 received when the apples are sold by the bushel?
5. At the rate of 6 pounds for 42 cents, how much would a bushel of apples cost?



Measuring Temperature

There is a thermometer just outside one of the school-room windows. The pupils read the thermometer each day at 9 A.M. and again at 2 P.M. Then they record their readings on a weather chart.



Temperature is measured in **degrees**. On the thermometer at the left, the little black marks show the degrees.

The space between 0 and 10 stands for 10 degrees. This space is divided into how many equal parts? Each part stands for $\frac{1}{5}$ of 10 degrees, or 2 degrees.

Two degrees is written this way: 2° . Notice the sign ($^{\circ}$) that means degrees.

On December 1, Jean read the thermometer at 9 A.M. The black temperature line was 3 small spaces above 10° . Since each small space stands for 2° , Jean knew that it was 6° above the 10-degree mark, or 16° above zero.

James read the thermometer at 2 P.M. The black temperature line stood 4 spaces above the 20-degree mark. The 4 spaces mean ? degrees.

James said, "The temperature is now 28° above zero."

1. How much did the temperature rise between 9 A.M. and 2 P.M.?
2. On January 5, the black temperature line was 1 small space above zero. What was the temperature then?
3. What is the temperature today where you live?

Reading a Thermometer

1. Water freezes when the thermometer reads 32° above zero. This point is called the **freezing point**.

Does the thermometer on page 244 show a temperature above or below the freezing point?

2. When the mercury in the thermometer drops to the 0° mark, the temperature is **zero**.

One morning in January, Alice found that the mercury had dropped 3 small spaces below zero. That meant the temperature was 6° **below zero**. It is written -6° , and is read, "minus 6 degrees."

What does -10° mean? -12° ?

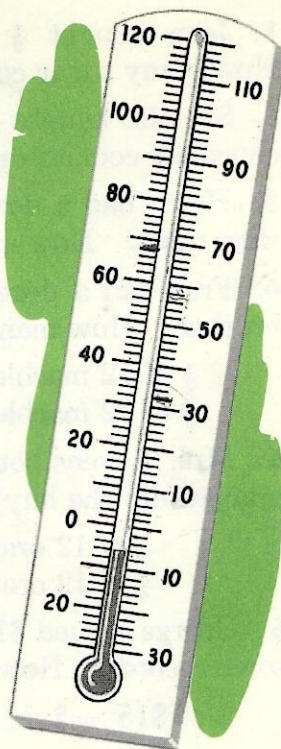
3. By 2 P.M. the thermometer read 8° above zero. How much had the temperature risen since 9 A.M.?

4. One December morning the temperature in Los Angeles, California, was 57° . In St. Paul, Minnesota, the temperature was -34° . What was the difference in temperature between the two cities?

5. A good temperature for schools and homes is 68° . This is how many degrees above freezing?

6. Read the weather report in the newspaper for your locality. Keep a record for one week of the temperature at the same hour each day.

7. Water boils at a temperature of 212° . This point is called the **boiling point**. The boiling point is how many degrees above the freezing point?



Finding Parts of a Group

1. Jean bought $\frac{1}{2}$ dozen sugar cookies at the bakery. How many sugar cookies did she buy?

2. She also bought $\frac{1}{4}$ dozen chocolate cookies. How many chocolate cookies did she buy?

3. Helen had a dozen flowers in her bouquet; $\frac{1}{3}$ of them were roses. How many roses did she have?

4. Fred had a dozen marbles. He gave $\frac{2}{3}$ of them to his brother. How many marbles did he give to his brother?

$$\frac{1}{3} \text{ of } 12 \text{ marbles} = 4 \text{ marbles}$$

$$\frac{2}{3} \text{ of } 12 \text{ marbles} = 2 \times 4 \text{ marbles} = 8 \text{ marbles}$$

5. Mrs. Stevens bought $\frac{3}{4}$ of a dozen oranges. How many oranges did she buy?

$$\frac{1}{4} \text{ of } 12 \text{ oranges} = \underline{\quad ? \quad} \text{ oranges}$$

$$\frac{3}{4} \text{ of } 12 \text{ oranges} = 3 \times \underline{\quad ? \quad} = 9 \text{ oranges}$$

6. George earned \$15. He spent $\frac{2}{3}$ of this amount to buy some records. How much money did he spend?

$$\frac{1}{3} \text{ of } \$15 = \$ \underline{\quad ? \quad} \quad \frac{2}{3} \text{ of } \$15 = 2 \times \underline{\quad ? \quad} = \$ \underline{\quad ? \quad}$$

7. Anne had $\frac{3}{4}$ of a yard of ribbon. How many inches of ribbon did she have? How many inches in 1 yard?

8. Mrs. Cox bought $\frac{3}{4}$ pound of ground meat. How many ounces of meat did she buy?

9. Jack and his brother Dick spent \$20 for some new clothes. Jack spent $\frac{2}{5}$ of this amount for a sweater, and Dick spent $\frac{3}{5}$ of the amount for a mackinaw. How much did each boy spend?



10. At 40 cents a pound, how much will $\frac{1}{4}$ pound of mints cost? What will $\frac{3}{4}$ of a pound cost?

11. At 48 cents a dozen, what will be the cost of $\frac{5}{6}$ dozen doughnuts?

12. A new road was being built between Austin and Morristown, a distance of 27 miles, and $\frac{2}{3}$ of the road had been completed. This was how many miles?

13. What does each of these equal? Write the answers.

A. $\frac{1}{4}$ of 12 in.
 $\frac{3}{4}$ of 12 in.

D. $\frac{1}{8}$ of 60 min.
 $\frac{3}{8}$ of 60 min.

G. $\frac{1}{6}$ of 24 hr.
 $\frac{5}{6}$ of 24 hr.

B. $\frac{1}{4}$ of 16 oz.
 $\frac{3}{4}$ of 16 oz.

E. $\frac{1}{8}$ of 32 qt.
 $\frac{3}{8}$ of 32 qt.

H. $\frac{1}{5}$ of 60 sec.
 $\frac{2}{5}$ of 60 sec.

C. $\frac{1}{3}$ of 18 oranges
 $\frac{2}{3}$ of 18 oranges

F. $\frac{1}{4}$ of 24 hr.
 $\frac{3}{4}$ of 24 hr.

I. $\frac{1}{5}$ of \$45
 $\frac{4}{5}$ of \$45

Matching Words and Abbreviations

Here are some of the measures you have been using. Copy these measures and then choose the correct abbreviation for each one from the list below.

Remember that the same abbreviation may be used to mean one or more than one.

1. pound, pounds

7. gallon, gallons

2. ounce, ounces

8. foot, feet

3. pint, pints

9. mile, miles

4. minute, minutes

10. peck, pecks

5. second, seconds

11. bushel, bushels

6. quart, quarts

12. yard, yards

qt. lb. oz. in. yr. pt. da. gal. min. mo.
ft. bu. wk. pk. doz. T. sec. yd. mi. hr.

Which Measure Should You Use?

Write the abbreviation of the unit, or units, of measure which you think should be used to measure each of the things listed below. Refer to page 247 if you are not sure of all the abbreviations.

- | | |
|-----------------------|--------------------------------|
| 1. Your weight | 8. Cloth for a skirt |
| 2. Your age | 9. Load limit for a bridge |
| 3. Number of eggs | 10. Length of a post card |
| 4. Gasoline for car | 11. Weight of a candy bar |
| 5. Your height | 12. Distance between towns |
| 6. Thirty-one days | 13. Time in school each day |
| 7. Milk used each day | 14. Length of a telephone call |

Copy the larger of the two measures given in each of the following exercises:

- | A | B | C |
|---------------------|-------------------|------------------------------|
| 15. 1 qt. or 2 cups | 3 ft. or 40 in. | 2000 lb. or $\frac{1}{2}$ T. |
| 16. 1 yr. or 16 mo. | 1 lb. or 10 oz. | 2 doz. or 30 |
| 17. 2 gal. or 9 qt. | 2 hr. or 130 min. | 8 ft. or 3 yd. |
| 18. 10 da. or 2 wk. | 2 min. or 90 sec. | 1 bu. or 3 pk. |

Estimate the following measurements and then check your estimate by measuring exactly:

19. The length and width of your arithmetic book
20. The height of the door in your schoolroom
21. The time it takes you to walk directly home from school
22. The weight of a football; the weight of a baseball; the weight of a basketball.

Saving Money by Wise Buying

1. Mrs. Roberts can buy a 1-pound jar of peanut butter for 37 cents, or a 2-pound jar for 67 cents. How much does she save if she buys the 2-pound jar?
2. A quart bottle of furniture polish sells for \$1.50, and a half-gallon can for \$2.75. How much is saved by buying the half-gallon can instead of two quart bottles?
3. One pint of this furniture polish costs 85¢. How much is saved by buying a quart bottle instead of 2 pints?
4. An 8-ounce jar of strained honey costs 19 cents. A jar of honey weighing 1 pound can be bought for 29 cents. How much is saved by buying a pound jar instead of two 8-ounce jars?
5. A certain size glass of jelly sells for 25 cents, or 5 glasses sell for \$1.00. How much is saved by buying 5 glasses of jelly at one time?
6. A pint of ice cream costs 40 cents. A quart costs 75 cents. How much is saved by buying a quart instead of two pints?
7. Some fruit juice sells for 13 cents a can, or \$1.45 for a dozen cans. How much is saved by buying a dozen cans at one time?
8. If bought in small amounts, sugar costs 8 cents a pound. A 25-pound bag costs \$1.50. If bought this way, what is the cost per pound? How much is saved on one pound? on 25 pounds?
9. One jar of cherries costs 35 cents, but a dozen jars cost \$3.85. How much is saved by buying a dozen jars?

Making Sure of Measures

Write the answer to each question asked below, and draw the figures mentioned in Example 3. For help, turn to the pages listed.

1. 5690 ft. = ? ft. more than 1 mi. 220
2. 2 ft. 6 in. = ✓ in.; 48 in. = ? ft. 221
3. Draw a rectangle, a square, and a triangle. 222-223
4. What is the perimeter of a flower bed that is 10 ft. long and 6 ft. wide? 223
5. 4 gal. 2 qt. = ✓ qt.; 10 pt. = ? qt. 224-227
6. Each morning Mr. Stewart takes a train which leaves at 8:30. One day the train was 35 minutes late in leaving. What time did it leave? 229
7. 2 hr. 10 min. = ? min.; 1200 sec. = ? min. 229
8. John went skating at 9:30 Saturday morning. He returned home at 10:45 A.M. How long was he gone? 230
9. Is it 11 A.M. or 3 P.M. in Denver when it is 1 P.M. in Washington, D. C.? 232
10. Leap year has ? da. 235
11. On August 6, Richard's cousin came to make a two-weeks' visit. On what date would he return home? 235
12. 400 years = ? centuries. 236
13. In what century was the year 1750? 1865? 236
14. 4000 lb. = ? T.; 80 oz. = ? lb. 238
15. 36 pk. = ? bu.; 2 bu. = ? pk. = ✓ qt. 242
16. 70° is how many degrees above freezing? 245
17. What does -8° mean? 245
18. $\frac{3}{8}$ of 48 in. = ? in.; $\frac{4}{5}$ of 20 ft. = ? ft. 246

Using Measures in the Home

1. When Susan started to make hot chocolate, she found the recipe required 4 cups of milk. If she had only 1 pint of milk, what part of the recipe could she make?
2. One morning Nancy's mother baked 3 dozen drop cookies. One-fourth of the cookies were served for lunch. How many cookies were left?
3. Mrs. Morse buys 2 quarts of milk a day. How many gallons does she buy in 4 days?
4. Mrs. Todd wants to allow 1 hour and 15 minutes to cook a roast. If she wishes to serve dinner at 6 o'clock, at what time should she put the roast in the oven?
5. Helen's mother is going to can 3 pecks of tomatoes. If a bushel of tomatoes makes an average of 20 quarts, how many quarts will there be in 3 pecks?
6. Mrs. Jones bought a package of frozen green peas that weighed 40 ounces. How many pounds and ounces did she buy?
7. Mrs. Taylor bought 6 yards of carpet at \$8.95 a yard. How much did she pay for 6 yards?
8. One size can of grapefruit juice contains $5\frac{3}{4}$ cups. A smaller can contains $2\frac{1}{4}$ cups. How much more juice is there in the larger can?
9. When Anne made fudge she cooked it to the soft-ball stage, which is 234° . This is how many degrees above the boiling point of water?



Keeping in Practice

1. Add and check:

A	B	C	D
9435	6582	4287	3780
4500	5706	3973	8934
<u>3628</u>	<u>4128</u>	<u>6432</u>	<u>8743</u>

2. Subtract and check:

\$53.03	\$48.40	\$70.32	\$95.67
<u>16.75</u>	<u>20.98</u>	<u>39.47</u>	<u>78.79</u>

Multiply and check:

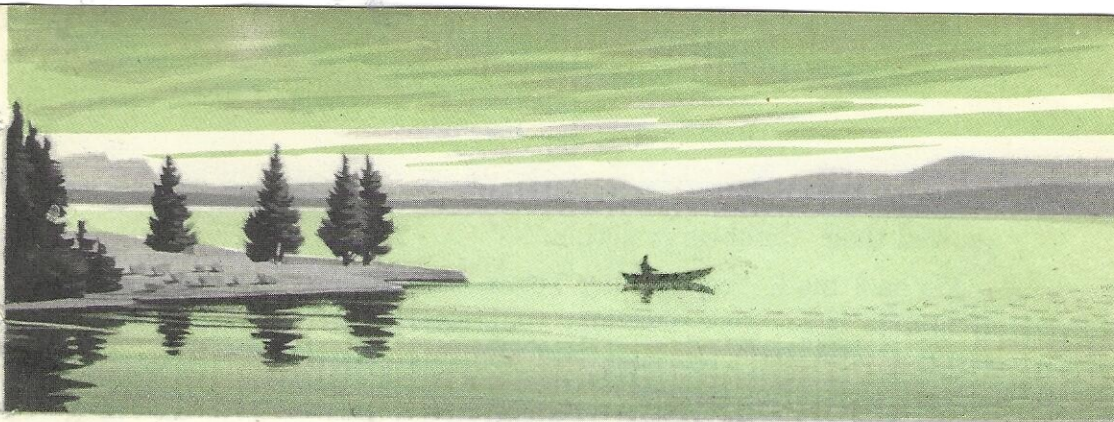
3. \$.39	\$2.98	\$9.30	\$7.06
<u>60</u>	<u>54</u>	<u>78</u>	<u>39</u>
4. 5830	4832	8047	9567
<u>73</u>	<u>45</u>	<u>82</u>	<u>56</u>

Divide and check:

5. $86 \overline{)8165}$	$95 \overline{)6686}$	$66 \overline{)6433}$	$57 \overline{)3065}$
6. $92 \overline{)85316}$	$53 \overline{)47817}$	$77 \overline{)53921}$	$74 \overline{)59449}$
7. $28 \overline{)21056}$	$37 \overline{)33496}$	$69 \overline{)7291}$	$87 \overline{)43858}$

KEEPING ON YOUR TOES

1. \$1.60 minus eighty-five cents = ?
2. Find the product of 835 and 46.
3. Nineteen dollars and forty-eight cents plus eight dollars and sixty-nine cents = ?
4. Divide 724 by 47.



Yellowstone National Park

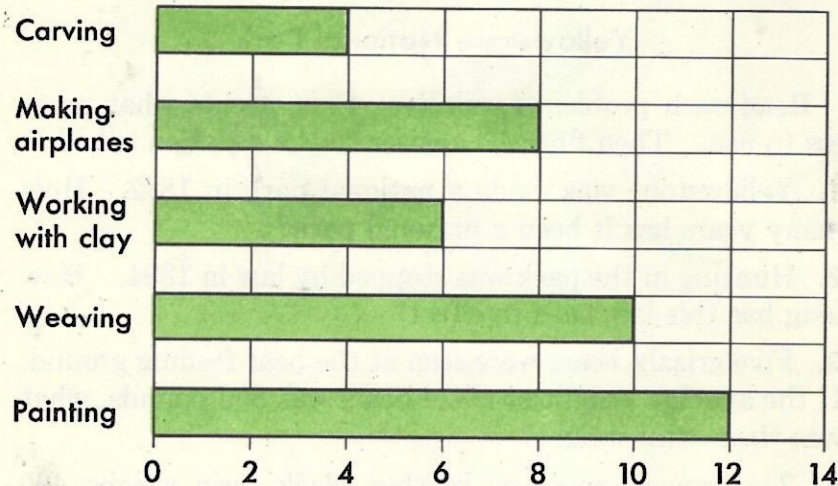
Read each problem carefully. First decide what process to use. Then find the answer to the question asked.

1. Yellowstone was made a national park in 1872. How many years has it been a national park?
2. Hunting in the park was stopped by law in 1894. How long has this law been in effect?
3. Five grizzly bears were seen at the bear feeding ground. If the average weight of these bears was 800 pounds, what was their total weight?
4. The ranger says one mother black bear weighs 400 pounds. If each of her two cubs weighs 75 pounds, what is the total weight of the three bears?
5. Eagle Mountain is the highest peak in Yellowstone Park. It is 11,360 feet high. Mount Washburn, 10,317 feet high, is the best-known peak. Eagle Mountain is how much higher than Mount Washburn?
6. Yellowstone Park, which is shaped like a rectangle, is about 62 miles long and 56 miles wide. The perimeter of the park is about how many miles?
7. Yellowstone Lake is the largest body of water within the park. Its surface is 7,735 feet above sea level. It is how many feet more than a mile above sea level?

Reading a Bar Graph

At the hobby show in Clark School, some of the pupils showed their "hobbies in action."

Michael made the drawing below to show the number of pupils who were carving, making model airplanes, working with clay, weaving, and painting. Such a drawing is called a **bar graph**.



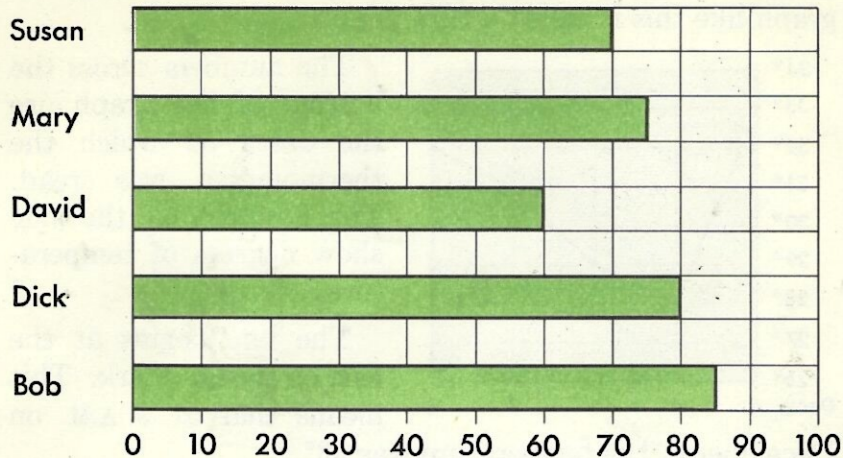
The numbers across the bottom of the graph tell the number of pupils who were working at the different hobbies. Each line marks off a space that stands for 2 pupils.

The bar which shows the number of children who were carving, ends at the line marked 4. This means that there were 4 pupils carving.

1. How many pupils were painting?
2. How many were weaving? making model airplanes? working with clay?
3. How many more children were weaving than carving?
4. Which group was the largest? the smallest?

Making a Bar Graph

Helen made a bar graph to show the weight of 5 of her classmates.



The numbers across the bottom of the graph stand for pounds. Each space between the lines stands for 10 pounds.

Notice that the bar showing Bob's weight ends halfway between the numbers 80 and 90. This shows that Bob's weight is halfway between 80 pounds and 90 pounds, or 85 pounds.

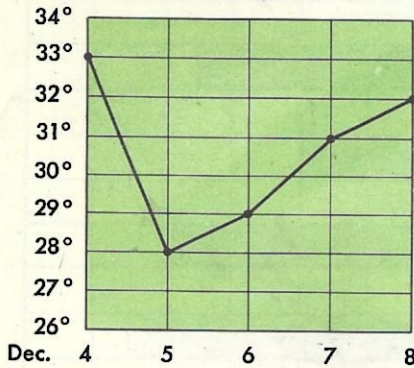
When a bar ends between two numbers, you can estimate the number to the nearest pound.

1. What was the weight of Dick? David? Mary? Susan?
2. Which child weighed the most? the least?
3. John earned \$10, Tom \$15, Jerry \$25, and Dan \$35. Draw a bar graph like the one above to show these facts.

Make the graph 4 inches long, and draw the lines $\frac{1}{2}$ inch apart. Let each space across the bottom of the graph stand for \$5.

Reading Line Graphs

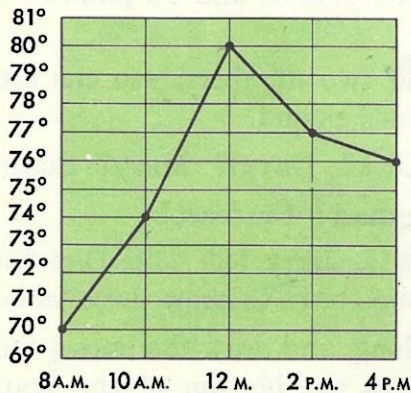
Richard made a graph like the one below to show the thermometer readings at 9 A.M. for one school week. A graph like this is called a **line graph**.



The numbers across the bottom of the graph are the dates on which the thermometer was read. The numbers at the side show degrees of temperature.

The line begins at the left, on the 33° mark. This means that at 9 A.M. on December 4, the temperature was 33°.

1. On which date at 9 A.M. was the temperature the highest? the lowest?
2. Between what two dates was there the greatest change in temperature?
3. On what date was it above freezing at 9 A.M.?

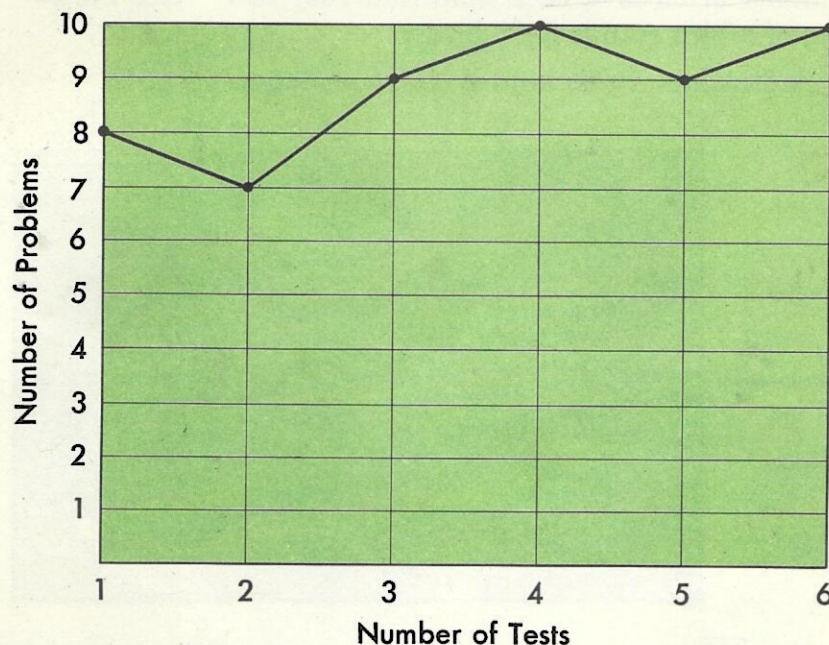


Jean made a line graph to show the thermometer readings at different hours on the same day. The numbers at the bottom show the hours at which she read the thermometer.

4. At what hour was the temperature highest? lowest?
5. What was the temperature at 10 o'clock? at 2 o'clock?

Making a Line Graph

Ralph made a line graph to show his scores on six problem-solving tests.

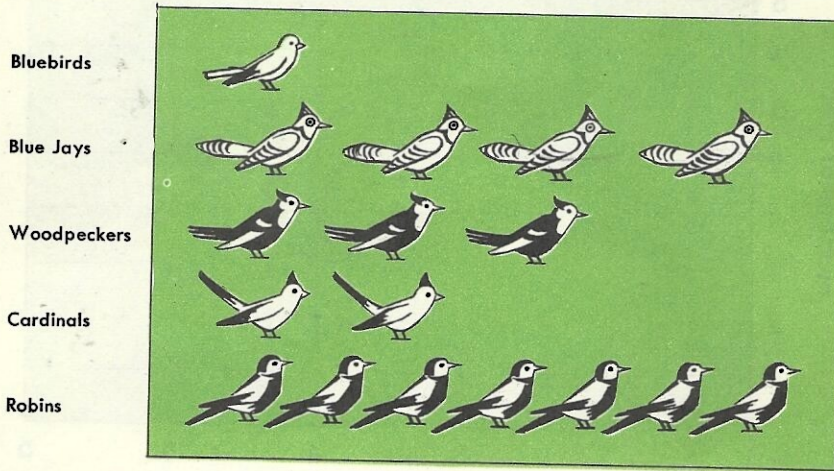


1. How many problems did Ralph solve correctly on the first test?
2. On which test did he miss the most problems?
3. On what tests did he make the same score?
4. On what tests did he solve all of the problems correctly?
5. Make a line graph like the one above, to show Paul's record in problem-solving tests for six weeks. Paul's scores for the six tests were: 9, 10, 8, 7, 9, and 10.
6. Bring to school graphs which you find in newspapers and magazines. Put them on the bulletin board for the class to see.

Using Pictures to Tell Facts

John and David counted the number of birds they saw on a hike. They made the drawings below to show the number of birds of each kind that they saw. Each drawing of a bird stands for 3 birds.

A drawing of this kind is called a **picture graph**.



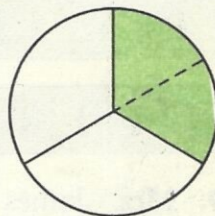
Read the picture graph and answer the following questions:

1. How many robins did the boys see? How many blue jays? woodpeckers? cardinals? bluebirds?
2. Judging from the number of birds they saw, which birds were the most common?
3. How many more robins than bluebirds did they see? How many times as many?
4. They saw how many more robins than woodpeckers?
5. They saw how many more woodpeckers than cardinals?
6. How many more blue jays than cardinals did they see? How many times as many?

LEARNING TO ADD AND SUBTRACT UNLIKE FRACTIONS

Equal Fractions

1. Fold a sheet of paper in a way that shows that $\frac{1}{2}$ of a sheet is the same as $\frac{2}{4}$.
2. Use your ruler to draw a line $\frac{1}{2}$ inch long; a line $\frac{4}{8}$ of an inch long. Do the two lines show that $\frac{1}{2} = \frac{4}{8}$?
3. Draw a square and divide it into equal parts in order to show that $\frac{3}{4} = \frac{6}{8}$.
4. Helen bought $\frac{1}{2}$ pound of butter. How many $\frac{1}{4}$ -pound pieces did she buy?
5. How does the drawing at the right show that $\frac{1}{3} = \frac{2}{6}$?
6. Draw a rectangle. Then divide it into 12 equal parts. How many twelfths are there in $\frac{1}{2}$? in $\frac{1}{4}$? in $\frac{1}{3}$? in $\frac{1}{6}$?
7. Draw a rectangle and divide it into tenths. How many tenths equal $\frac{1}{2}$? $\frac{1}{3}$?



Copy the examples below and supply the missing numerators. If you need help, look at the drawings on page 181.

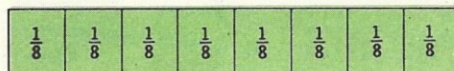
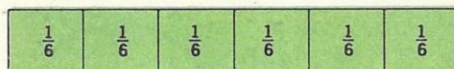
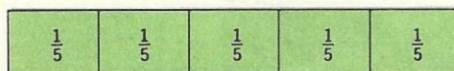
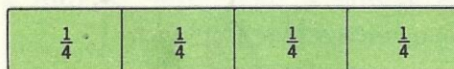
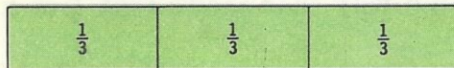
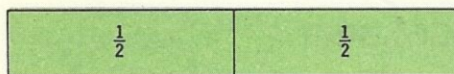
A	B	C	D
8. $\frac{1}{4} = \frac{?}{8}$	$\frac{1}{2} = \frac{?}{4}$	$\frac{1}{3} = \frac{?}{6}$	$\frac{1}{2} = \frac{?}{8}$
9. $\frac{3}{4} = \frac{?}{8}$	$\frac{3}{8} = \frac{?}{16}$	$\frac{1}{4} = \frac{?}{12}$	$\frac{1}{2} = \frac{?}{12}$
10. $\frac{2}{3} = \frac{?}{6}$	$\frac{1}{2} = \frac{?}{6}$	$\frac{3}{4} = \frac{?}{12}$	$\frac{3}{4} = \frac{?}{16}$
11. $\frac{1}{6} = \frac{?}{12}$	$\frac{1}{3} = \frac{?}{12}$	$\frac{5}{6} = \frac{?}{12}$	$\frac{2}{3} = \frac{?}{12}$

12. How many thirds are there in a whole? how many sixths? eighths? twelfths?

Which Is More?

The rectangles below are the same size and have been divided into equal parts. They will help you compare the fractions on this page. Decide which fraction in each

pair is larger. Then copy that fraction on your paper.



A

B

- | | |
|-----------------------------------|-----------------------------------|
| 1. $\frac{1}{4}$ or $\frac{1}{5}$ | 5. $\frac{2}{3}$ or $\frac{7}{8}$ |
| 2. $\frac{1}{2}$ or $\frac{1}{6}$ | 6. $\frac{1}{2}$ or $\frac{5}{6}$ |
| 3. $\frac{1}{6}$ or $\frac{1}{5}$ | 7. $\frac{5}{8}$ or $\frac{3}{4}$ |
| 4. $\frac{3}{4}$ or $\frac{3}{8}$ | 8. $\frac{3}{6}$ or $\frac{3}{5}$ |

9. Mrs. James has two recipes for gingerbread. One calls for $\frac{2}{3}$ cup of molasses and the other for $\frac{3}{4}$ cup. Which recipe calls for the larger amount of molasses?

10. Mrs. Dean's recipe for white sauce calls for $\frac{1}{2}$ teaspoon salt and $\frac{1}{8}$ teaspoon pepper. Which is more, $\frac{1}{2}$ teaspoon or $\frac{1}{8}$ teaspoon?

11. A recipe for molded fruit salad calls for $\frac{1}{4}$ cup lemon juice and $\frac{1}{2}$ cup orange juice. Is more, or less, lemon juice used than orange juice?

12. Mary practiced $\frac{1}{3}$ of an hour on Monday and $\frac{1}{2}$ hour on Tuesday. On which day did she practice longer?

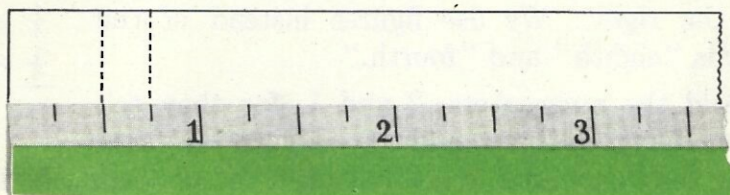
13. Amy has $\frac{3}{8}$ yard of yellow organdy and $\frac{3}{4}$ yard of pink organdy. What color is the longer piece?



Measuring for a Border

Edward made a large map of the United States. He made a margin around the map by drawing a line $\frac{1}{2}$ inch from the edge of the paper. Then to make a border, he drew another line $\frac{1}{4}$ inch from the first line. What was the total width of the margin and the border?

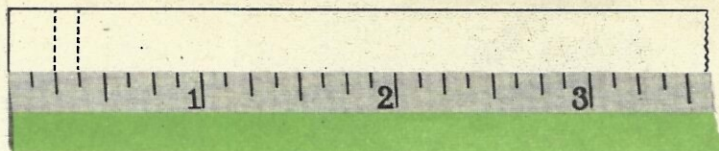
Edward used a ruler and measured $\frac{1}{2}$ inch. Then he measured $\frac{1}{4}$ inch more. The ruler showed that the width of the margin and the border was $\frac{3}{4}$ inch. He could tell from the ruler that $\frac{1}{2}$ and $\frac{1}{4}$ equal $\frac{3}{4}$.



Look at the ruler. Is $\frac{1}{2}$ inch the same as $\frac{2}{4}$ inch? Edward could have changed $\frac{1}{2}$ to $\frac{2}{4}$, and then added $\frac{2}{4}$ and $\frac{1}{4}$.

We can write the example as shown at the right. It is just as easy to add 2 fourths and 1 fourth as it is to add 2 pencils and 1 pencil, because 2 fourths and 1 fourth are *like fractions*.

$$\begin{array}{rcl} 1 \text{ half} & = & 2 \text{ fourths} \\ 1 \text{ fourth} & = & 1 \text{ fourth} \\ \hline & & 3 \text{ fourths} \end{array}$$



Nancy drew a small picture. To make a margin around the picture, she drew a line $\frac{1}{4}$ inch from the edge of the paper. Then to make a border, she drew another line $\frac{1}{8}$ inch from the first line. What was the total width of the margin and the border?

Nancy used her ruler to add fractions, just as Edward did. She measured $\frac{1}{4}$ inch and then measured $\frac{1}{8}$ inch more. She could tell from the ruler that $\frac{1}{4}$ inch and $\frac{1}{8}$ inch = $\frac{3}{8}$ inch.

Is $\frac{1}{4}$ inch the same as $\frac{2}{8}$ inch?

When Nancy added $\frac{1}{4}$ and $\frac{1}{8}$, she was adding $\frac{2}{8}$ and $\frac{1}{8}$.

We can write the example this way:

$$\begin{array}{r} 1 \text{ fourth} = 2 \text{ eighths} \\ 1 \text{ eighth} = 1 \text{ eighth} \\ \hline 3 \text{ eighths} \end{array}$$

Another way of writing the example is shown at the right. We use figures instead of the words "eighth" and "fourth."

$$\begin{array}{r} \frac{1}{4} = \frac{2}{8} \\ \frac{1}{8} = \frac{1}{8} \\ \hline \frac{3}{8} \end{array}$$

Add the numerators, 2 and 1, for they tell how many we are adding. Write the sum over the denominator. What does the denominator tell?

► You know that like fractions have the same denominator. Like fractions can be added by adding the numerators.

Fractions such as $\frac{1}{4}$ and $\frac{1}{8}$ do not have the same denominator. They are called **unlike fractions**.

► Before you can add unlike fractions, you must change the fractions so that the denominators are the same.

Changing Fractions

1. Look at the section of the ruler shown at the right.



Cover $\frac{3}{4}$ inch. Now cover $\frac{6}{8}$ inch. Are the two fractions the same part of an inch? Are $\frac{3}{4}$ and $\frac{6}{8}$ equal in value?

To change fourths to eighths, by what number do you multiply the denominator 4? Think, how many 4's in 8? There are two 4's in 8, so the denominator, 4, must be multiplied by 2. Multiply the numerator, 3, by the same number, 2.

$$\frac{2 \times 3}{2 \times 4} = \frac{6}{8}$$

2. Change $\frac{2}{3}$ to twelfths. By what number do you multiply the denominator of the fraction $\frac{2}{3}$ to change it to twelfths? $12 \div 3 = 4$. You multiply both terms of $\frac{2}{3}$ by 4 to change it to twelfths.

$$\frac{4 \times 2}{4 \times 3} = \frac{8}{12}$$

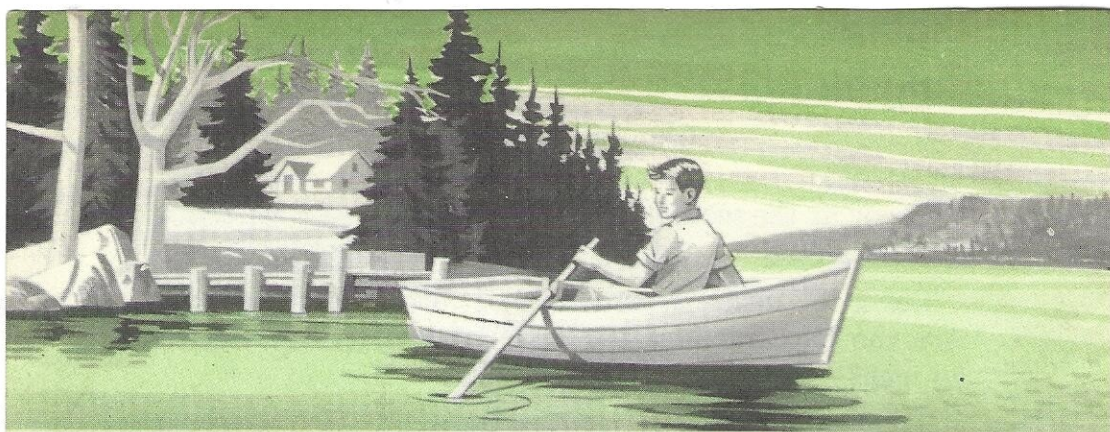
3. Change $\frac{1}{4}$ to sixteenths. $16 \div 4 = 4$. Multiply both terms of $\frac{1}{4}$ by 4 to change it to sixteenths.

$$\frac{4 \times 1}{4 \times 4} = \frac{4}{16}$$

► When we multiply **both terms** of a fraction by the same number, we get an **equal fraction**, but the numerator and the denominator are larger.

In each example below, tell by what number you would multiply to find the missing numerator. Then tell what the second fraction would be.

A	B	C	D	E
4. $\frac{1}{4} = \frac{?}{8}$	$\frac{1}{2} = \frac{?}{6}$	$\frac{1}{2} = \frac{?}{4}$	$\frac{1}{3} = \frac{?}{6}$	$\frac{5}{8} = \frac{?}{16}$
5. $\frac{1}{2} = \frac{?}{12}$	$\frac{1}{6} = \frac{?}{12}$	$\frac{3}{4} = \frac{?}{8}$	$\frac{1}{4} = \frac{?}{12}$	$\frac{1}{2} = \frac{?}{8}$
6. $\frac{1}{3} = \frac{?}{12}$	$\frac{3}{4} = \frac{?}{12}$	$\frac{1}{5} = \frac{?}{10}$	$\frac{1}{2} = \frac{?}{16}$	$\frac{2}{3} = \frac{?}{12}$
7. $\frac{2}{5} = \frac{?}{10}$	$\frac{5}{6} = \frac{?}{12}$	$\frac{3}{4} = \frac{?}{16}$	$\frac{2}{3} = \frac{?}{6}$	$\frac{7}{8} = \frac{?}{16}$



Adding Unlike Fractions

It is $\frac{1}{8}$ mile from Kenneth's house to the pier, and $\frac{1}{2}$ mile across the lake to the store. How far is it from Kenneth's house to the store?

To find the answer, we must add $\frac{1}{8}$ and $\frac{1}{2}$.

Since the denominators of these two fractions are not the same, we must not add the numerators. We must change either $\frac{1}{8}$ or $\frac{1}{2}$ so that both fractions will have the same denominator.

We cannot change $\frac{1}{8}$ to halves, but we can change $\frac{1}{2}$ to eighths: $\frac{1}{2} = \frac{4}{8}$. Now we can add the numerators of the two like fractions.

$$\begin{array}{r} \frac{1}{8} = \frac{1}{8} \text{ mile} \\ \frac{1}{2} = \frac{4}{8} \\ \hline \frac{5}{8} \text{ mile} \end{array}$$

How far is it from Kenneth's house to the store?

► Like fractions, such as $\frac{1}{8}$ and $\frac{4}{8}$, have the same number as denominator. We say that they have a **common denominator**.

All of the people in Nancy's family have curly hair. Since this is true of each member of her family, we say that they have that in **common**.

So it is with fractions. In the fractions $\frac{1}{6}$ and $\frac{5}{6}$, the denominator of each fraction is 6, so 6 is the common denominator of the two fractions.

Practice in Adding Unlike Fractions

Richard was printing a school announcement on a large poster. He did $\frac{1}{3}$ of the printing during the art period and $\frac{1}{6}$ of it after school. What part of the printing did he have finished then?

To find the answer, add $\frac{1}{3}$ and $\frac{1}{6}$.

Are the denominators the same? $\frac{1}{3} = \frac{2}{6}$
 Which fraction should you change? $\frac{1}{6} = \frac{1}{6}$
 $\frac{1}{3} = \frac{2}{6}$. How do you get the 3 in $\frac{3}{6}$? $\frac{2}{6} + \frac{1}{6} = \frac{3}{6}$

Remember that when there is a fraction in the answer, it should be reduced to lowest terms.

How can $\frac{3}{6}$ be reduced to $\frac{1}{2}$?

What part of the printing did Richard have finished?

- Study the examples below. Then copy the examples and add. Compare your work with the work in the book.

A

$$\frac{1}{6} = \frac{1}{6}$$

$$\frac{1}{2} = \frac{3}{6}$$

$$\frac{1}{2} + \frac{1}{6} = \frac{4}{6} = \frac{2}{3}$$

B

$$\frac{3}{8} = \frac{3}{8}$$

$$\frac{1}{2} = \frac{4}{8}$$

$$\frac{3}{8} + \frac{4}{8} = \frac{7}{8}$$

C

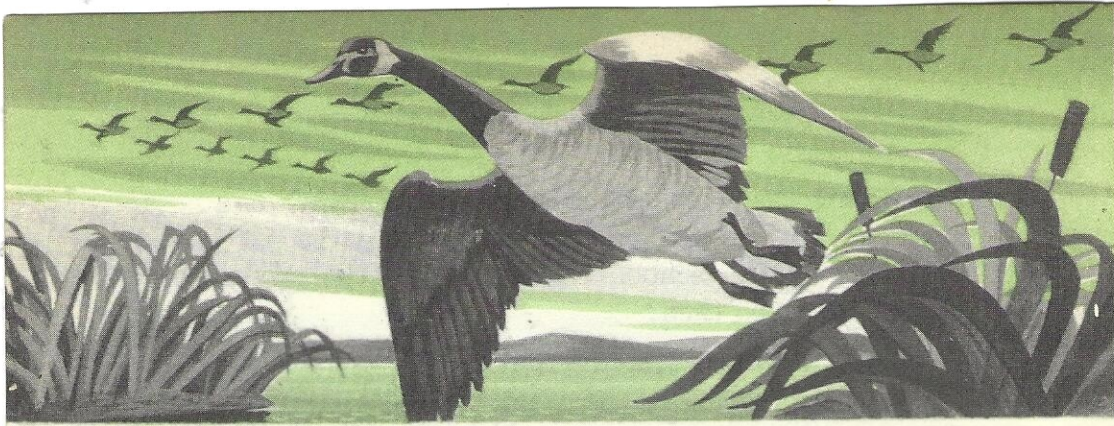
$$\frac{1}{2} = \frac{5}{10}$$

$$\frac{3}{10} = \frac{3}{10}$$

$$\frac{1}{2} + \frac{3}{10} = \frac{8}{10} = \frac{4}{5}$$

Copy the following examples and add. You cannot add until you have changed one fraction in each example.

	A	B	C	D	E	F
2.	$\frac{1}{4}$ $\frac{3}{8}$	$\frac{2}{5}$ $\frac{1}{10}$	$\frac{1}{2}$ $\frac{1}{6}$	$\frac{2}{3}$ $\frac{1}{6}$	$\frac{1}{2}$ $\frac{1}{6}$	$\frac{1}{3}$ $\frac{5}{12}$
3.	$\frac{1}{2}$ $\frac{1}{12}$	$\frac{1}{4}$ $\frac{1}{12}$	$\frac{1}{8}$ $\frac{3}{4}$	$\frac{1}{10}$ $\frac{4}{5}$	$\frac{7}{12}$ $\frac{1}{6}$	$\frac{3}{5}$ $\frac{3}{10}$
4.	$\frac{1}{2}$ $\frac{1}{4}$	$\frac{3}{8}$ $\frac{1}{2}$	$\frac{1}{2}$ $\frac{1}{10}$	$\frac{1}{5}$ $\frac{1}{10}$	$\frac{1}{4}$ $\frac{1}{16}$	$\frac{1}{12}$ $\frac{1}{6}$



Finding Facts about Birds

1. A Canada goose travels at an average speed of 50 miles an hour. At this rate, how far can it travel in 32 hours? Sometimes it flies this distance without making a stop.
2. In 12 hours, the golden plover can fly over the Atlantic Ocean, from Labrador to the West Indies. This is a distance of 1500 miles. At what average rate of speed does it fly?
3. The arctic tern is one of the greatest bird travelers. Each year it migrates from Arctic to Antarctic regions and back again, a distance of about 22,000 miles. Its annual trip is about how many miles less than the distance around the earth, which is about 25,000 miles?
4. It has been found that the smaller birds usually travel about 23 miles a day. At this rate, how far can they travel in two weeks?
5. Sometimes robins fly only 8 miles a day. At this rate, how long would it take robins to fly from Mexico City to Chicago, a distance of 1680 miles?
6. At other times robins travel as much as 70 miles a day. At this rate, how long would it take them to travel from Mexico City to Chicago?

Changing Fractions to Whole or Mixed Numbers

1. Richard needed $\frac{3}{4}$ yard of green cord to put his scrapbook together, and Jack needed $\frac{1}{2}$ yard. How much cord did they need in all?

What must you do before you can add $\frac{1}{2}$ and $\frac{3}{4}$? Which fraction should you change? One-half equals how many fourths? How many fourths are there in all? The answer, $\frac{5}{4}$, is an improper fraction.

How many fourths make one whole? Then $\frac{5}{4}$ is how much more than one?

How much cord did the boys need?

2. Study the example at the right. Here you must change two of the fractions before you can add.

Do you see that the common denominator of these three fractions would be 10? One-half equals how many tenths? Three-fifths equals how many tenths?

How do you get the 18 in $\frac{18}{10}$? The answer, $\frac{18}{10}$, is how much more than one? How is $\frac{8}{10}$ reduced? What is the sum?

3. In the example at the right, what common denominator would you use? The sum, $\frac{12}{6}$, is an improper fraction. It can be changed to a whole number.

How many sixths in one? Twelve 6's equal ?

Turn to pages 197-199 if you need help in changing improper fractions to whole or mixed numbers.

$$\begin{array}{r} \frac{3}{4} = \frac{3}{4} \\ \frac{1}{2} = \frac{2}{4} \\ \hline \frac{5}{4} = 1\frac{1}{4} \end{array}$$

$$\begin{array}{r} \frac{1}{2} = \frac{5}{10} \\ \frac{3}{5} = \frac{6}{10} \\ \frac{7}{10} = \frac{7}{10} \\ \hline \frac{18}{10} \end{array}$$

$$\frac{18}{10} = 1\frac{8}{10}$$

$$1\frac{8}{10} = 1\frac{4}{5}$$

$$\begin{array}{r} \frac{2}{3} = \frac{4}{6} \\ \frac{1}{2} = \frac{3}{6} \\ \frac{5}{6} = \frac{5}{6} \\ \hline \frac{12}{6} = 2 \end{array}$$

Practice with Fractions

Reduce these fractions to lowest terms:

	A	B	C	D	E	F
1.	$\frac{6}{8}$	$\frac{5}{10}$	$\frac{4}{12}$	$\frac{8}{10}$	$\frac{4}{16}$	$\frac{6}{9}$
2.	$\frac{4}{6}$	$\frac{10}{12}$	$\frac{3}{9}$	$\frac{9}{12}$	$\frac{2}{8}$	$\frac{2}{4}$

Change the improper fractions below to mixed numbers. If possible, reduce the fractions in the answers to lowest terms.

3.	$\frac{12}{8}$	$\frac{8}{6}$	$\frac{22}{4}$	$\frac{15}{10}$	$\frac{19}{8}$	$\frac{12}{5}$
4.	$\frac{14}{4}$	$\frac{28}{6}$	$\frac{20}{8}$	$\frac{20}{12}$	$\frac{11}{8}$	$\frac{22}{10}$

The examples below are like those on page 267. Add, and change the sums to whole or mixed numbers. Reduce the fractions in the answers if necessary.

	A	B	C	D	E	F	G
5.	$\frac{1}{4}$ $\frac{7}{8}$	$\frac{5}{6}$ $\frac{1}{3}$	$\frac{1}{2}$ $\frac{5}{8}$	$\frac{7}{10}$ $\frac{4}{5}$	$\frac{5}{8}$ $\frac{3}{4}$	$\frac{2}{3}$ $\frac{5}{6}$	$\frac{7}{10}$ $\frac{1}{2}$
6.	$\frac{1}{2}$ $\frac{2}{3}$ $\frac{1}{12}$	$\frac{3}{4}$ $\frac{1}{3}$ $\frac{5}{12}$	$\frac{1}{2}$ $\frac{1}{5}$ $\frac{3}{10}$	$\frac{5}{8}$ $\frac{1}{4}$ $\frac{3}{16}$	$\frac{1}{3}$ $\frac{5}{6}$ $\frac{1}{2}$	$\frac{1}{4}$ $\frac{11}{12}$ $\frac{1}{2}$	$\frac{5}{8}$ $\frac{1}{2}$ $\frac{3}{4}$

KEEPING ON YOUR TOES

1. In what century was the year 1803? the year 1645?
2. How many times would you have to reset your watch while traveling from Boston to San Francisco?
3. Fred had a birthday party on February 29. When George left the party, he said, "We had a good time, Fred, but we won't see you next year on this date." What did he mean? How long will it be until Fred's next birthday?

Adding Fractions and Whole Numbers

1. Sally bought $\frac{1}{2}$ pound of small chocolates, $\frac{1}{4}$ pound of mints, and 2 pounds of hard candy to put in little paper cups for her party. How much candy did she buy?

You add fractions and a whole number to find the answer to this question.

First write the fractions and the whole number in separate columns.

Add the fractions first:

$\frac{1}{2}$ pound and $\frac{1}{4}$ pound are $\frac{3}{4}$ pound.

There is no whole number to add to 2, so write the 2 to the left of the fraction.

$$\begin{array}{r} \frac{1}{2} = \frac{2}{4} \text{ pound} \\ \frac{1}{4} = \frac{1}{4} \\ \hline 2 = 2 \\ \hline 2\frac{3}{4} \text{ pounds} \end{array}$$

How much candy did Sally buy?

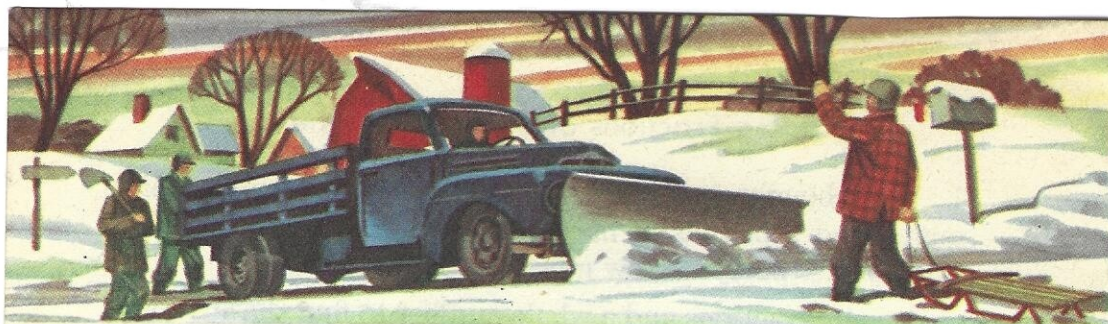
2. What kinds of numbers have been added in the example shown at the right? Notice that the fractions are written in a separate column.

$$\begin{array}{r} 7 = 7 \\ \frac{1}{3} = \frac{2}{6} \\ \frac{1}{6} = \frac{1}{6} \\ \hline 7\frac{3}{6} = 7\frac{1}{2} \end{array}$$

Why is $\frac{3}{6}$ changed to $\frac{1}{2}$? What is the sum?

Copy the examples below and add. Reduce the fractions in the sums if they are not in lowest terms.

	A	B	C	D	E
✓ 3.	$\frac{3}{8}$	7	9	3	$\frac{1}{5}$
	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{10}$
	<u>5</u>	<u>$\frac{1}{8}$</u>	<u>$\frac{1}{12}$</u>	<u>$\frac{7}{12}$</u>	<u>6</u>
✓ 4.	$\frac{1}{2}$	$\frac{1}{2}$	10	$\frac{1}{12}$	$\frac{1}{8}$
	$\frac{1}{6}$	8	$\frac{1}{3}$	$\frac{1}{6}$	4
	<u>12</u>	<u>$\frac{1}{10}$</u>	<u>$\frac{5}{12}$</u>	<u>15</u>	<u>$\frac{1}{16}$</u>



5. On one January day, the weather bureau reported a snowfall of 9 inches, the next day $\frac{3}{4}$ inch, and the third day $\frac{1}{2}$ inch. How many inches of snow fell on the three days?

Add the fractions first:

$\frac{3}{4}$ inch and $\frac{1}{2}$ inch are $\frac{5}{4}$ inch. There are also 9 whole inches.

In all there are $9\frac{5}{4}$ inches. $\frac{5}{4}$ inches equal $1\frac{1}{4}$ inches. What is the sum of 9 and $1\frac{1}{4}$?

$$\begin{array}{r} 9 = 9 \\ \frac{3}{4} = \frac{3}{4} \\ \frac{1}{2} = \frac{2}{4} \\ \hline 9\frac{5}{4} = 10\frac{1}{4} \end{array}$$

6. Look at the example at the right. The sum of the fractions and the whole number is $6\frac{15}{10}$. How many tenths are there in one? Then $\frac{15}{10}$ is equal to what? How is $\frac{5}{10}$ changed to $\frac{1}{2}$?

$$\begin{array}{r} 6 = 6 \\ \frac{3}{5} = \frac{6}{10} \\ \frac{9}{10} = \frac{9}{10} \\ \hline 6\frac{15}{10} \end{array}$$

$$6\frac{15}{10} = 7\frac{5}{10}$$

$$7\frac{5}{10} = 7\frac{1}{2}$$

What is the sum?

7. To make Christmas cookies, Mrs. Ray used 2 pounds of walnuts, $\frac{3}{4}$ pound of almonds, $\frac{3}{4}$ pound of pecans, and $\frac{1}{2}$ pound of brazil nuts. How many pounds of nuts did she use?

$$\begin{array}{r} 2 = 2 \\ \frac{3}{4} = \frac{3}{4} \\ \frac{3}{4} = \frac{3}{4} \\ \frac{1}{2} = \frac{2}{4} \\ \hline 2\frac{8}{4} = 4 \end{array}$$

The sum of the fractions and the whole number is $2\frac{8}{4}$. The $\frac{8}{4}$ is how many pounds?

Then 2 pounds + ? pounds = 4 pounds.

Practice in Adding Fractions and Whole Numbers

Copy the examples below and add. Reduce the fractions in the sums if they are not in lowest terms.

	A	B	C	D	E
1.	$\begin{array}{r} \frac{5}{8} \\ \frac{3}{4} \\ \hline 3 \end{array}$	$\begin{array}{r} \frac{7}{8} \\ 9 \\ \frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 11 \\ \frac{1}{5} \\ \frac{9}{10} \\ \hline \end{array}$	$\begin{array}{r} 15 \\ \frac{3}{8} \\ \frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} 14 \\ \frac{2}{3} \\ \frac{5}{6} \\ \hline \end{array}$
2.	$\begin{array}{r} 16 \\ \frac{5}{6} \\ \frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} \frac{3}{4} \\ \frac{5}{12} \\ 6 \\ \hline \end{array}$	$\begin{array}{r} \frac{3}{8} \\ \frac{3}{8} \\ \frac{1}{4} \\ 10 \\ \hline \end{array}$	$\begin{array}{r} \frac{7}{12} \\ 14 \\ \frac{7}{12} \\ \frac{5}{6} \\ \hline \end{array}$	$\begin{array}{r} 8 \\ \frac{7}{10} \\ \frac{7}{10} \\ \frac{3}{5} \\ \hline \end{array}$
3.	$\begin{array}{r} 20 \\ \frac{7}{16} \\ \frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} \frac{2}{3} \\ \frac{5}{9} \\ 18 \\ \hline \end{array}$	$\begin{array}{r} 21 \\ \frac{5}{6} \\ \frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 5 \\ \frac{4}{5} \\ \frac{4}{5} \\ \frac{9}{10} \\ \hline \end{array}$	$\begin{array}{r} \frac{7}{16} \\ \frac{7}{16} \\ 7 \\ \frac{1}{4} \\ \hline \end{array}$

Read and answer the following questions:

4. Why are $\frac{1}{5}$ and $\frac{4}{5}$ called like fractions?
5. Why are $\frac{1}{8}$ and $\frac{5}{8}$ called unlike fractions?
6. What kind of number is $6\frac{3}{4}$?
7. Before the fractions, $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{12}$ can be added, they should be changed so that they have what common denominator?
8. What kind of fraction is $\frac{9}{8}$?
9. Three pupils worked the example at the right. One said the sum was $\frac{14}{10}$, another said the sum was $1\frac{4}{10}$, and the third pupil said it was $1\frac{2}{5}$. Which is the best answer?

$$\begin{array}{r} \frac{3}{10} = \frac{3}{10} \\ \frac{3}{10} = \frac{3}{10} \\ \frac{4}{5} = \frac{8}{10} \\ \hline \frac{14}{10} \end{array}$$

$$\begin{array}{r} \frac{14}{10} = 1\frac{4}{10} \\ 1\frac{4}{10} = 1\frac{2}{5} \end{array}$$

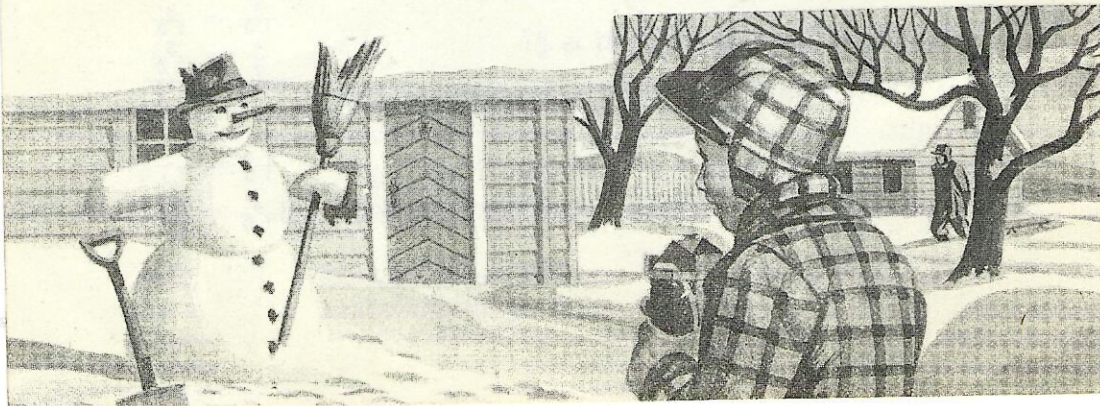
What Does the Question Ask?

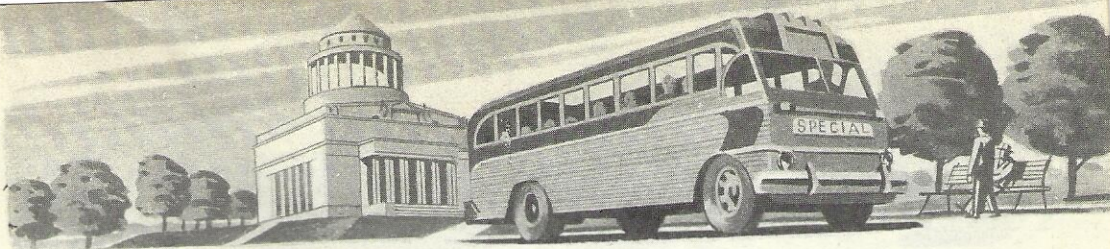
Each of the two problems below asks a question which helps you to decide what process you should use to solve the problem. The same facts are given in both problems, but the questions are different. Tell what process to use.

1. George had 50 pictures of animals and 39 pictures of birds. How many animal and bird pictures did he have? (What process should you use to solve this problem?)
2. George had 50 pictures of animals and 39 pictures of birds. How many more animal than bird pictures did he have? (What process should you use this time?)

Read each of the statements below carefully and write a question that might be asked to make a problem. Then find the answer to the question.

3. Last week Arthur paid \$1.98 for a football and \$1.25 for a baseball.
4. Jack weighs 80 lb. His dog weighs 20 lb.
5. Frank has saved 2 dollars. David has saved 8 times as much money as Frank.
6. Jean bought 4 yards of lace that cost 45 cents a yard.
7. Ruth bought a scarf that cost \$1.35. She gave the clerk two dollars.
8. Mrs. Ford paid \$1.80 for 3 yards of gingham.
9. Tom used 4 rolls of film to take 32 pictures.





Adding Mixed Numbers

1. Charles and his father took two sight-seeing trips around the city. One trip took $2\frac{1}{4}$ hours, and the other $1\frac{1}{2}$ hours. How long did it take to make the two trips?

To find the answer, you must add the mixed numbers, $2\frac{1}{4}$ and $1\frac{1}{2}$. Before you can add them, you must make the denominators of the fractions the same.

$$\begin{array}{r} 2\frac{1}{4} = 2\frac{1}{4} \\ 1\frac{1}{2} = 1\frac{2}{4} \\ \hline 3\frac{3}{4} \end{array}$$

One-half equals how many fourths? Add the fractions first, then the whole numbers.

How many hours did it take to make the two trips?

2. Ted rode his bicycle $4\frac{1}{2}$ miles one morning and $2\frac{3}{10}$ miles in the afternoon. How many miles did he ride that day?

Which fraction do you change before you can add? How is the fraction $\frac{8}{10}$ in the answer changed to $\frac{4}{5}$?

$$\begin{array}{r} 4\frac{1}{2} = 4\frac{5}{10} \\ 2\frac{3}{10} = 2\frac{3}{10} \\ \hline 6\frac{8}{10} = 6\frac{4}{5} \end{array}$$

How many miles did Ted ride?

Copy the examples below and add. Be sure that all fractions in the answers are reduced to lowest terms.

	A	B	C	D	E	F
3.	$5\frac{1}{2}$ $3\frac{1}{4}$	$2\frac{1}{3}$ $8\frac{1}{6}$	$6\frac{3}{8}$ $10\frac{1}{2}$	$7\frac{1}{2}$ $4\frac{1}{2}$	$6\frac{1}{6}$ $3\frac{1}{2}$	$9\frac{1}{3}$ $2\frac{1}{2}$
4.	$9\frac{2}{5}$ $6\frac{1}{10}$	$8\frac{1}{6}$ $7\frac{1}{2}$	$6\frac{1}{10}$ $5\frac{1}{2}$	$4\frac{1}{4}$ $9\frac{3}{8}$	$5\frac{1}{8}$ $4\frac{3}{16}$	$6\frac{1}{16}$ $7\frac{1}{4}$



More about Adding Mixed Numbers

On one fishing trip Ralph caught a pike weighing $3\frac{1}{2}$ pounds, and John caught one weighing $4\frac{3}{4}$ pounds. How much did the two fish weigh?

Which fraction do you change before you can add?

What is the sum of the fractions?

What is the sum of the whole numbers?

How is the sum $7\frac{5}{4}$ changed to $8\frac{1}{4}$?

$$\begin{array}{r} 3\frac{1}{2} = 3\frac{2}{4} \\ 4\frac{3}{4} = 4\frac{3}{4} \\ \hline 7\frac{5}{4} = 8\frac{1}{4} \end{array}$$

Copy the following examples and add:

	A	B	C	D	E	F
1.	$\begin{array}{r} 6\frac{5}{6} \\ 2\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 7\frac{7}{8} \\ 3\frac{1}{4} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{7}{8} \\ 2\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 4\frac{5}{12} \\ 5\frac{2}{3} \\ \hline \end{array}$	$\begin{array}{r} 5\frac{7}{10} \\ 6\frac{3}{5} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{3}{4} \\ 9\frac{5}{12} \\ \hline \end{array}$
2.	$\begin{array}{r} 8\frac{3}{4} \\ 6\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 4\frac{9}{10} \\ 4\frac{1}{5} \\ \hline \end{array}$	$\begin{array}{r} 6\frac{7}{16} \\ 7\frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} 8\frac{11}{12} \\ 9\frac{1}{6} \\ \hline \end{array}$	$\begin{array}{r} 9\frac{5}{8} \\ 5\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 7\frac{1}{2} \\ 8\frac{7}{10} \\ \hline \end{array}$

Things to Remember in Adding Mixed Numbers

First, change unlike fractions to like fractions.

Then, add the fractions.

Next, find the sum of the whole numbers.

When the sum of the fractions is an improper fraction, change it to a whole or a mixed number.

Add the sum of the fractions to the sum of the whole numbers. Reduce the fraction in the sum to lowest terms.

Practice in Adding Mixed Numbers

A

$$\begin{array}{r} 5\frac{1}{3} = 5\frac{2}{6} \\ 2\frac{1}{2} = 2\frac{3}{6} \\ 6\frac{5}{6} = 6\frac{5}{6} \\ \hline 13\frac{10}{6} = 14\frac{4}{6} = 14\frac{2}{3} \end{array}$$

B

$$\begin{array}{r} 2\frac{3}{8} = 2\frac{3}{8} \\ 8\frac{1}{2} = 8\frac{4}{8} \\ 7\frac{3}{4} = 7\frac{6}{8} \\ 3\frac{3}{8} = 3\frac{3}{8} \\ \hline 20\frac{16}{8} = 22 \end{array}$$

Study Examples A and B. In Example A, how many fractions must be changed before you can add? In the answer, the $\frac{10}{6}$ is what kind of fraction? How should you change it?

In Example B, the sum of the fractions is $\frac{16}{8}$. This fraction is equal to what whole number?

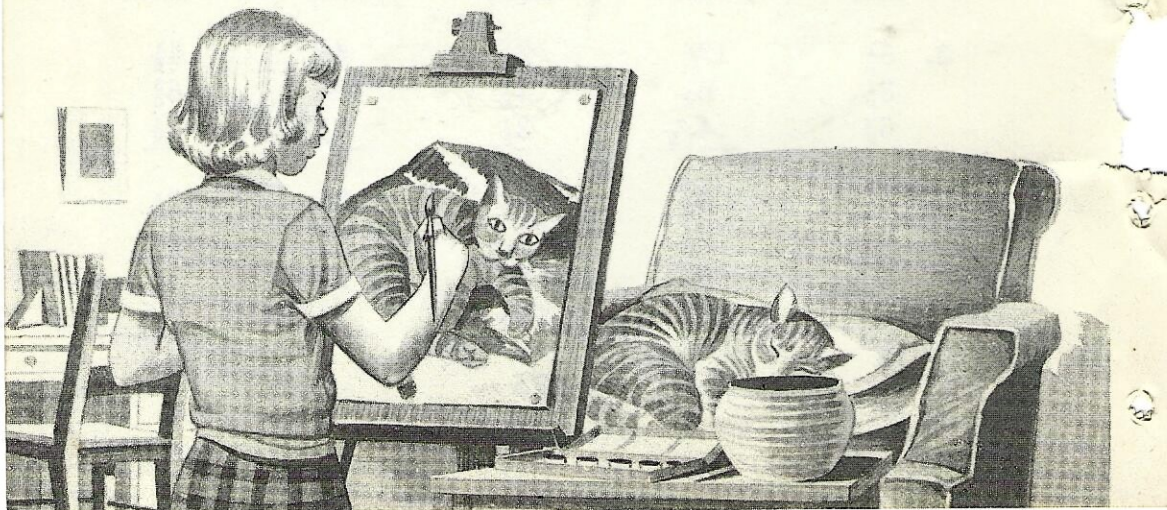
Copy the following examples and add. Reduce the fractions in the sums to lowest terms.

	A	B	C	D	E
1.	$\begin{array}{r} 7\frac{3}{4} \\ 4\frac{5}{8} \\ \hline \end{array}$	$\begin{array}{r} 1\frac{2}{3} \\ 3\frac{5}{12} \\ \hline \end{array}$	$\begin{array}{r} 2\frac{5}{6} \\ 3\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 6\frac{3}{8} \\ 10\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 4\frac{3}{4} \\ 7\frac{1}{2} \\ \hline \end{array}$
2.	$\begin{array}{r} 8\frac{1}{2} \\ 4\frac{5}{8} \\ \hline \end{array}$	$\begin{array}{r} 5\frac{3}{4} \\ 4\frac{5}{12} \\ \hline \end{array}$	$\begin{array}{r} 12\frac{2}{3} \\ 7\frac{5}{6} \\ \hline \end{array}$	$\begin{array}{r} 10\frac{7}{8} \\ 6\frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} 9\frac{1}{4} \\ 5\frac{11}{12} \\ \hline \end{array}$
3.	$\begin{array}{r} 5\frac{1}{4} \\ 3\frac{1}{2} \\ 6\frac{3}{8} \\ \hline \end{array}$	$\begin{array}{r} 10\frac{3}{4} \\ 5\frac{1}{2} \\ 4\frac{7}{12} \\ \hline \end{array}$	$\begin{array}{r} 2\frac{1}{2} \\ 4\frac{1}{4} \\ 3\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 4\frac{2}{3} \\ 10\frac{1}{2} \\ 8\frac{1}{6} \\ \hline \end{array}$	$\begin{array}{r} 4\frac{1}{6} \\ 6\frac{5}{6} \\ 7\frac{1}{2} \\ \hline \end{array}$
4.	$\begin{array}{r} 4\frac{2}{5} \\ 6\frac{1}{2} \\ 5\frac{3}{10} \\ \hline \end{array}$	$\begin{array}{r} 5\frac{1}{8} \\ 2\frac{1}{8} \\ 6\frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} 6\frac{1}{3} \\ 8\frac{5}{12} \\ 2\frac{5}{6} \\ 6\frac{5}{6} \\ \hline \end{array}$	$\begin{array}{r} 5\frac{1}{2} \\ 9\frac{3}{4} \\ 2\frac{3}{8} \\ 1\frac{3}{8} \\ \hline \end{array}$	$\begin{array}{r} 12\frac{1}{2} \\ 18\frac{4}{5} \\ 3\frac{2}{5} \\ 7\frac{3}{10} \\ \hline \end{array}$

What Facts Are Needed?

In each of the following problems one important fact is missing. Supply a fact and then solve the problem.

1. James spent \$2.45 for a baseball bat. How much money did he have left? (What other fact must you know before you can solve the problem? How would you answer the question if you knew that James handed the clerk a five-dollar bill?)
2. Kenneth paid the same price for each of 4 model airplanes. How much did he spend for the airplanes?
3. Helen spent \$6.95 for a new hat, and the rest of her money for a book. How much did she spend in all?
4. Jack and Andy earned some money by selling vegetables from their garden. If they shared the money equally, how much did each boy earn?
5. Sally received 4 new books for her birthday. How many books did she have altogether?
6. Mary bought ice-cream cones for herself and 3 of her friends. How much did she pay for the cones?
7. Anne spent \$2.95 for a large box of water-color paints, and 78 cents for white drawing paper. How much change did she receive?



Keeping in Practice

Copy and add:

	A	B	C	D	E	F
1.	$\frac{2}{5}$ $\frac{1}{5}$	$\frac{3}{10}$ $\frac{1}{10}$	$\frac{1}{6}$ $\frac{1}{6}$	$\frac{3}{8}$ $\frac{1}{8}$	$\frac{1}{4}$ $\frac{1}{4}$	$\frac{5}{8}$ $\frac{1}{8}$
2.	$8\frac{5}{9}$ $6\frac{1}{9}$	$6\frac{1}{12}$ $9\frac{5}{12}$	$7\frac{1}{10}$ $3\frac{1}{10}$	$8\frac{7}{12}$ $8\frac{1}{12}$	$9\frac{1}{3}$ $2\frac{1}{3}$	$6\frac{3}{10}$ $4\frac{3}{10}$
3.	$\frac{7}{8}$ $\frac{7}{8}$	$\frac{3}{4}$ $\frac{3}{4}$	$\frac{5}{6}$ $\frac{5}{6}$	$\frac{1}{2}$ $\frac{1}{2}$	$\frac{3}{5}$ $\frac{3}{5}$	$\frac{5}{12}$ $\frac{7}{12}$
4.	$4\frac{7}{12}$ $5\frac{7}{12}$	$7\frac{5}{8}$ $3\frac{3}{8}$	$8\frac{3}{4}$ $8\frac{1}{4}$	$6\frac{4}{5}$ $5\frac{2}{5}$	$9\frac{2}{3}$ $7\frac{2}{3}$	$10\frac{5}{6}$ $4\frac{1}{6}$

Copy and subtract:

5.	$\frac{7}{10}$ $\frac{3}{10}$	$\frac{5}{6}$ $\frac{1}{6}$	$\frac{4}{5}$ $\frac{2}{5}$	$\frac{3}{4}$ $\frac{1}{4}$	$\frac{7}{8}$ $\frac{5}{8}$	$\frac{5}{12}$ $\frac{1}{12}$
6.	$9\frac{5}{8}$ $2\frac{1}{8}$	$11\frac{9}{10}$ $5\frac{7}{10}$	$15\frac{11}{12}$ $8\frac{5}{12}$	$18\frac{5}{16}$ $9\frac{1}{16}$	$\frac{2}{3}$ $\frac{1}{3}$	$\frac{3}{5}$ $\frac{1}{5}$

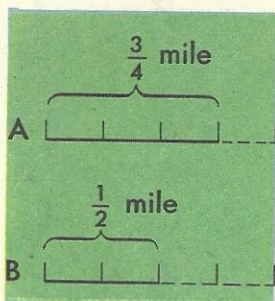
7. Mrs. Jones used $10\frac{7}{8}$ yards of gingham to make draperies for Jean's room and $11\frac{3}{8}$ yards of green rayon for draperies for the living room. How many yards of material did she use?

8. Mrs. Scott made $4\frac{2}{3}$ dozen doughnuts. Susan took $2\frac{1}{3}$ dozen to school to serve at a school party. How many dozen doughnuts were left?

9. Donald made two shelves for his room. One shelf was $4\frac{3}{4}$ feet long and the other $3\frac{1}{4}$ feet long. How many feet of board did he need for the two shelves?

Subtracting Unlike Fractions

1. The beach is $\frac{3}{4}$ of a mile from Dick's house and $\frac{1}{2}$ mile from Jack's house. How much farther from the beach does Dick live than Jack?



Line A shows how far Dick lives from the beach.

Line B shows how far away Jack lives.

Line B shows that $\frac{1}{2}$ mile is the same as $\frac{2}{4}$ mile. Jack lives $\frac{2}{4}$ mile from the beach.

Tell from the lines how much farther away Dick lives than Jack.

You can find the answer to this question without using the lines. You can subtract $\frac{1}{2}$ from $\frac{3}{4}$. Subtracting $\frac{1}{2}$ from $\frac{3}{4}$ is the same as subtracting $\frac{2}{4}$ from $\frac{3}{4}$.

The example is shown at the right. Subtract the smaller numerator, 2, from the larger numerator, 3. Write the 1 over the denominator, 4. What is the answer?

$$\begin{array}{r} \frac{3}{4} = \frac{3}{4} \text{ mi.} \\ \frac{1}{2} = \frac{2}{4} \\ \hline \frac{1}{4} \text{ mi.} \end{array}$$

2. Jean was making an apron. She had $\frac{1}{2}$ yard of plain gingham and $\frac{1}{8}$ yard of checked gingham to use for trimming. How much more plain gingham did she have?

Subtract $\frac{1}{8}$ yard from $\frac{1}{2}$ yard. Look at the denominators of these fractions. Are they the same?

Before you can subtract, you will have to change one of the fractions to make the denominators alike. Which fraction should you change, $\frac{1}{2}$ or $\frac{1}{8}$?

$$\begin{array}{r} \frac{1}{2} = \frac{4}{8} \text{ yd.} \\ \frac{1}{8} = \frac{1}{8} \\ \hline \frac{3}{8} \text{ yd.} \end{array}$$

How much more plain gingham did she have?

Practice in Subtracting Unlike Fractions

1. Frank and Richard were picking raspberries on their grandfather's farm. When they returned to the house, Frank had his pail $\frac{5}{6}$ full of berries, and Richard had his pail $\frac{1}{2}$ full. What is the difference between $\frac{5}{6}$ of a pail and $\frac{1}{2}$ of a pail?



Subtract $\frac{1}{2}$ from $\frac{5}{6}$ to find the answer.

Should you change $\frac{5}{6}$ to halves, or $\frac{1}{2}$ to sixths? How can you tell? How do you change $\frac{1}{2}$ to sixths? Why should $\frac{2}{6}$ in the answer be changed to $\frac{1}{3}$?

$$\begin{array}{r} \frac{5}{6} = \frac{5}{6} \\ \frac{1}{2} = \frac{3}{6} \\ \hline \frac{2}{6} = \frac{1}{3} \end{array}$$

2. Are the denominators alike in the example below? Which fraction should be changed?

How do you change $\frac{1}{3}$ to twelfths?

How do you get 3 for the numerator in the answer? How is $\frac{3}{12}$ reduced to $\frac{1}{4}$?

$$\begin{array}{r} \frac{1}{3} = \frac{4}{12} \\ \frac{1}{12} = \frac{1}{12} \\ \hline \frac{3}{12} = \frac{1}{4} \end{array}$$

Copy the following examples and subtract:

	A	B	C	D	E	F	G
3.	$\frac{1}{2}$ $\frac{3}{8}$	$\frac{1}{2}$ $\frac{1}{12}$	$\frac{5}{6}$ $\frac{2}{3}$	$\frac{7}{8}$ $\frac{3}{4}$	$\frac{3}{5}$ $\frac{3}{10}$	$\frac{7}{12}$ $\frac{1}{4}$	$\frac{5}{8}$ $\frac{1}{2}$
4.	$\frac{2}{3}$ $\frac{1}{6}$	$\frac{5}{6}$ $\frac{1}{12}$	$\frac{1}{3}$ $\frac{1}{12}$	$\frac{5}{6}$ $\frac{1}{3}$	$\frac{9}{10}$ $\frac{1}{2}$	$\frac{4}{9}$ $\frac{1}{3}$	$\frac{7}{12}$ $\frac{1}{6}$
5.	$\frac{1}{2}$ $\frac{1}{6}$	$\frac{7}{8}$ $\frac{1}{2}$	$\frac{1}{4}$ $\frac{1}{12}$	$\frac{7}{10}$ $\frac{1}{5}$	$\frac{3}{8}$ $\frac{1}{4}$	$\frac{3}{4}$ $\frac{5}{8}$	$\frac{1}{2}$ $\frac{5}{12}$

Subtracting Mixed Numbers

1. George weighs $78\frac{1}{2}$ pounds. His younger brother, Ted, weighs $60\frac{1}{4}$ pounds. How much less does Ted weigh?

Subtract the mixed number $60\frac{1}{4}$ from the mixed number $78\frac{1}{2}$.

Notice that the fractions and the whole numbers are written in separate columns.

$$\begin{array}{r} 78\frac{1}{2} = 78\frac{2}{4} \\ 60\frac{1}{4} = 60\frac{1}{4} \\ \hline 18\frac{1}{4} \end{array}$$

Why do you have to change $78\frac{1}{2}$ to $78\frac{2}{4}$ before you subtract?

Subtract the fractions first, then the whole numbers.

How much less does Ted weigh than George?

2. In the example at the right, why is $3\frac{1}{2}$ changed to $3\frac{3}{6}$? How is the answer, $4\frac{2}{6}$, changed to $4\frac{1}{3}$?

$$\begin{array}{r} 7\frac{5}{6} = 7\frac{5}{6} \\ 3\frac{1}{2} = 3\frac{3}{6} \\ \hline 4\frac{2}{6} = 4\frac{1}{3} \end{array}$$

Copy the following examples and subtract:

	A	B	C	D	E
3.	$\begin{array}{r} 2\frac{3}{4} \\ 1\frac{3}{8} \\ \hline \end{array}$	$\begin{array}{r} 5\frac{7}{8} \\ 2\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 11\frac{7}{8} \\ 4\frac{1}{4} \\ \hline \end{array}$	$\begin{array}{r} 12\frac{1}{2} \\ 8\frac{1}{4} \\ \hline \end{array}$	$\begin{array}{r} 9\frac{1}{2} \\ 3\frac{1}{8} \\ \hline \end{array}$
4.	$\begin{array}{r} 12\frac{5}{6} \\ 3\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 10\frac{1}{2} \\ 7\frac{1}{6} \\ \hline \end{array}$	$\begin{array}{r} 20\frac{7}{10} \\ 4\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 15\frac{2}{3} \\ 9\frac{1}{6} \\ \hline \end{array}$	$\begin{array}{r} 18\frac{5}{12} \\ 2\frac{1}{6} \\ \hline \end{array}$
5.	$\begin{array}{r} 42\frac{11}{12} \\ 25\frac{2}{3} \\ \hline \end{array}$	$\begin{array}{r} 84\frac{5}{6} \\ 16\frac{1}{12} \\ \hline \end{array}$	$\begin{array}{r} 59\frac{9}{10} \\ 30\frac{2}{5} \\ \hline \end{array}$	$\begin{array}{r} 67\frac{8}{15} \\ 43\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 70\frac{5}{24} \\ 58\frac{1}{12} \\ \hline \end{array}$

6. A chickadee is $5\frac{3}{4}$ inches long. A house wren is $4\frac{1}{2}$ inches long. The chickadee is how much longer than the house wren?

Making Sure of Fractions

Here is a test in addition and subtraction of fractions.

Set I

Add:

	A	B	C	D	E	
1.	$\frac{1}{4}$ $\frac{1}{8}$ — $\frac{3}{8}$	$\frac{3}{5}$ $\frac{1}{10}$ — $\frac{4}{10}$	$\frac{1}{2}$ $\frac{1}{8}$ — $\frac{5}{8}$	$\frac{3}{4}$ $\frac{1}{12}$ — $\frac{7}{12}$	$\frac{1}{5}$ $\frac{3}{10}$ — $\frac{4}{10}$	265
2.	$\frac{3}{4}$ $\frac{3}{8}$ — $\frac{9}{8}$	$\frac{3}{4}$ $\frac{1}{2}$ $\frac{1}{4}$ — $\frac{5}{4}$	$\frac{2}{3}$ $\frac{3}{4}$ $\frac{5}{12}$ — $\frac{17}{12}$	$\frac{5}{6}$ $\frac{2}{3}$ $\frac{1}{2}$ — $\frac{11}{6}$	$\frac{1}{2}$ $\frac{3}{4}$ $\frac{3}{4}$ — $\frac{7}{4}$	267 268
3.	$\frac{1}{4}$ $\frac{3}{8}$ 4 — 4	6 $\frac{1}{16}$ $\frac{3}{8}$ — 6	$\frac{1}{3}$ 3 $\frac{2}{9}$ — 3	$\frac{1}{6}$ $\frac{2}{3}$ 9 — 9	$\frac{1}{4}$ 7 $\frac{1}{12}$ — 7	269
4.	3 $\frac{3}{4}$ $\frac{7}{8}$ — 3	$\frac{7}{12}$ 8 $\frac{3}{4}$ — 8	$\frac{1}{3}$ $\frac{1}{4}$ $5\frac{5}{12}$ — 5	$\frac{5}{6}$ 10 $\frac{11}{12}$ — 10	16 $\frac{3}{5}$ $\frac{9}{10}$ — 16	270 271
5.	$6\frac{1}{2}$ $2\frac{1}{8}$ — 8	$5\frac{1}{2}$ $4\frac{3}{10}$ — 9	$7\frac{1}{5}$ $5\frac{2}{15}$ — 12	$9\frac{1}{3}$ $2\frac{5}{12}$ — 11	$6\frac{1}{3}$ $8\frac{1}{9}$ — 14	273
6.	$7\frac{9}{10}$ $8\frac{1}{2}$ — 15	$9\frac{3}{4}$ $4\frac{7}{12}$ — 14	$6\frac{4}{5}$ $5\frac{7}{10}$ — 11	$3\frac{1}{2}$ $5\frac{3}{4}$ $5\frac{1}{12}$ — 9	$12\frac{1}{2}$ $8\frac{1}{5}$ $7\frac{3}{10}$ — 20	274 275

Set II

Subtract:

1.	$\frac{9}{16}$ $\frac{1}{2}$ — $\frac{1}{16}$	$\frac{5}{8}$ $\frac{1}{4}$ — $\frac{3}{8}$	$\frac{5}{12}$ $\frac{1}{6}$ — $\frac{3}{12}$	$\frac{1}{2}$ $\frac{1}{10}$ — $\frac{4}{10}$	$\frac{7}{8}$ $\frac{1}{4}$ — $\frac{3}{8}$	279
2.	$8\frac{1}{2}$ $3\frac{1}{12}$ — 5	$9\frac{1}{4}$ $7\frac{1}{8}$ — 1	$6\frac{1}{2}$ $2\frac{3}{8}$ — 4	$10\frac{7}{12}$ $3\frac{1}{3}$ — 7	$12\frac{1}{2}$ $8\frac{3}{10}$ — 4	280

Understanding Words Used in Arithmetic

division	proper fraction	product
answer	improper fraction	average
quotient	mixed number	equal
difference	lowest terms	numerator
divisor	common denominator	like fractions
remainder	rectangle	square

From the list above, choose the word or words needed to complete each of the following sentences:

1. A fraction whose numerator is equal to or larger than its denominator is called an ? .
2. When you divide, the number that you divide by is called the ? .
3. Before unlike fractions can be added, they must have a ? .
4. A number which is made up of a whole number and a fraction is called a ? .
5. In answers, all fractions must be reduced to ? .
6. A fraction whose numerator is less than its denominator is called a ? .
7. The answer to a multiplication example is called the ? .
8. The number above the line in a fraction is called the ? .
9. In subtraction, the answer is called the ? , or the ? .
10. In division, the answer is called the ? .
11. The number that is left over when you divide is called the ? .
12. A rectangle whose four sides are equal is called a ? .



Using Fractions in Problems

Decide what you should do to solve each problem. Then find the answer to the question asked.

1. George won two trophies in sports events at school. One is $7\frac{3}{4}$ inches tall, and the other is $6\frac{1}{2}$ inches tall. What is the difference in the height of the two trophies?
2. David, George's older brother, showed him two large trophies that had been won by his school. One trophy is $26\frac{1}{2}$ inches tall, and the other is $17\frac{1}{4}$ inches tall. One is how much taller than the other?
3. On Saturdays Ralph helps his father in the grocery store. One Saturday he worked $4\frac{1}{2}$ hours and the next Saturday he worked $3\frac{3}{4}$ hours. How many hours did he work in all?
4. By one railroad it is $168\frac{1}{2}$ miles from Washington, D. C., to Trenton, New Jersey, and $48\frac{1}{10}$ miles farther to Newark, New Jersey. What is the distance from Washington to Newark?
5. It is $488\frac{3}{5}$ miles from Chicago to Harbor Springs, Michigan. It is $515\frac{7}{10}$ miles from Chicago to Mackinaw City, Michigan, by way of Harbor Springs. What is the distance from Harbor Springs to Mackinaw City?
6. Anne was learning to measure carefully. She used a ruler and drew a line $8\frac{7}{8}$ inches long. Then she made the line $3\frac{1}{4}$ inches longer. How long was the whole line?

Keeping in Practice

1. Copy the examples below and find the answers.

A. \$48.76 $\begin{array}{r} .58 \\ .09 \\ .43 \\ \hline 7.20 \end{array}$	B. Subtract: $\begin{array}{r} 4026 \\ 789 \\ \hline \end{array}$	C. Multiply: $\begin{array}{r} 743 \\ 278 \\ \hline \end{array}$	D. Multiply: $\begin{array}{r} 4680 \\ 65 \\ \hline \end{array}$
---	--	---	---

2. Which pairs of fractions are unlike fractions?

- | | | | |
|-------------------------------|-------------------------------|---------------------------------|-------------------------------|
| A. $\frac{3}{5}, \frac{2}{5}$ | C. $\frac{1}{3}, \frac{1}{4}$ | E. $\frac{1}{3}, \frac{1}{2}$ | G. $\frac{1}{4}, \frac{3}{4}$ |
| B. $\frac{2}{3}, \frac{1}{6}$ | D. $\frac{1}{8}, \frac{3}{8}$ | F. $\frac{5}{12}, \frac{1}{12}$ | H. $\frac{1}{2}, \frac{1}{5}$ |

3. What must you do before you can add each group of fractions?

- | | | |
|------------------------------------|-------------------------------------|-------------------------------------|
| A. $\frac{1}{4}$ and $\frac{3}{8}$ | B. $\frac{1}{5}$ and $\frac{1}{10}$ | C. $\frac{1}{4}$ and $\frac{1}{12}$ |
|------------------------------------|-------------------------------------|-------------------------------------|

4. Write the missing numerators:

- | | | |
|-----------------------------------|------------------------------------|-------------------------------------|
| A. $2\frac{1}{2} = 2\frac{?}{6}$ | C. $5\frac{3}{4} = 5\frac{?}{8}$ | E. $6\frac{3}{4} = 6\frac{?}{12}$ |
| B. $9\frac{1}{3} = 9\frac{?}{10}$ | D. $12\frac{1}{3} = 12\frac{?}{6}$ | F. $15\frac{1}{2} = 15\frac{?}{10}$ |

5. A. 29 inches = ? feet and ? inches.
 B. 14 feet = ? yards and ? feet.
 C. 1 hour and 10 minutes = ? minutes.

6. $7\overline{)517}$ $6\overline{)3617}$ $52\overline{)2499}$ $83\overline{)1494}$

KEEPING ON YOUR TOES

1. The divisor is 42, the quotient is 321, and the remainder is 3. What is the dividend?
2. The difference between 500 and another number is 297. What is the other number? Are there two possible answers?
3. The dividend is 2268 and the divisor is 63. What is the quotient?

Problems without Numbers

These problems have no numbers in them, but you can tell whether you should add, subtract, multiply, or divide to solve problems of this kind.

After you decide what to do to solve each one, make an easy problem of the same kind, using numbers.

1. Tom knows the number of basketball games won by the school team, and the number of games lost. How can he find the total number of games played?
2. You know how many letters you have to mail, and how much each stamp will cost. How do you find the cost of all the stamps?
3. You know the distance Frank jumped in a running broad jump. You also know the number of feet George jumped. How do you find how much farther one boy jumped than the other?
4. A group of pupils bought some records for the music room at school. If you know the cost of the records and the number of pupils who shared the cost, how can you find how much each pupil paid?
5. How can Helen find the difference between her age and her older sister's age?
6. Roy knows how many fish he caught one day, and how many he caught the next day. How can he find the number of fish he caught in the two days?
7. You know the number of children who will run in a relay race and how many teams are to be formed for the race. How do you find the number of children on each team?



LEARNING MORE ABOUT WHOLE NUMBERS

How Much Is a Billion?

You have learned that a million is a thousand thousand. Write in figures: ten million; one hundred million; one thousand million. One thousand million is **one billion**.

A DC-6 airplane costs about \$1,000,000. One thousand of these planes would cost about a billion dollars.

1. The number one billion is written at the right. How many figures are needed to write this number? **1,000,000,000**

Beginning at the right, large numbers are divided by commas into groups of 3 figures each. How many commas are needed to write the number one billion?

2. The number at the right shows the population of Asia according to a recent estimate. This number is read, 1 billion, 223 million. **1,223,000,000**

3. The numbers below show the production of some crops in the United States in a recent year. Read the numbers.

Corn	3,650,548,000 bushels
Wheat	1,288,406,000 bushels
Oats	1,491,752,000 bushels
Rice	81,170,000 bushels
Potatoes	445,850,000 bushels
Rye	26,388,000 bushels

4. Which was the larger crop, corn or oats? wheat or oats? rye or wheat?
5. Were more bushels of rice raised than potatoes?

Reading and Writing Numbers

1. Copy the following numbers. Place commas where they belong and then read the numbers.

4208695395	\$3989748796
\$8469784125	14000000000

Write these numbers in figures:

2. Eight billion, seven hundred nine million
3. Ten billion
4. Fifteen billion, seven hundred sixty-eight million, five hundred eighty thousand, two hundred thirty-four
5. Nineteen thousand, ten dollars

The numbers below show the distances in miles between the sun and the planets:

Earth	94,452,000	Saturn	935,570,000
Mercury	43,355,000	Pluto	4,300,000,000
Jupiter	506,710,000	Uranus	1,866,800,000
Venus	67,653,000	Mars	154,760,000
Neptune	2,817,400,000		

6. Which planet is the greatest distance from the sun?
7. Which planet is nearest the sun?
8. Name the planets that are billions of miles away from the sun.
9. Make a list of the planets, arranging them in the order of their distance from the sun. First, write the name of the planet that is nearest the sun. Then, write the name of the planet that is next nearest, and so on.

Adding Columns of Numbers

Sometimes when you keep scores in games you have to add columns of one-place numbers. You know that 0 means that there is nothing in that place to add.

1. Copy these scores and add. Check your work.

MARY	TOM	JIM	ANN	RAY	BETTY
3	5	7	8	9	6
7	4	5	8	2	3
0	1	8	4	5	8
8	0	6	0	7	4
6	7	0	9	0	7
4	5	4	5	1	8
<u>5</u>	<u>6</u>	<u>9</u>	<u>8</u>	<u>8</u>	<u>7</u>

2. Copy the examples below. Add and check. Be sure to keep the figures in straight columns, ones under ones and tens under tens.

A	B	C	D	E
64	38	50	87	49
49	19	95	48	57
30	83	37	59	62
68	27	75	31	60
45	80	87	83	55
<u>57</u>	<u>93</u>	<u>60</u>	<u>75</u>	<u>70</u>

3. Turn to page 10 and test yourself again on the addition facts. You must know the addition facts well, if you are to add larger numbers with ease.

Adding Larger Numbers

When you copy figures to add, always copy them accurately and neatly. Keep the columns straight.

In the examples below, remember to carry from both ones' and tens' columns. Add the carried figure to the first figure of the next column.

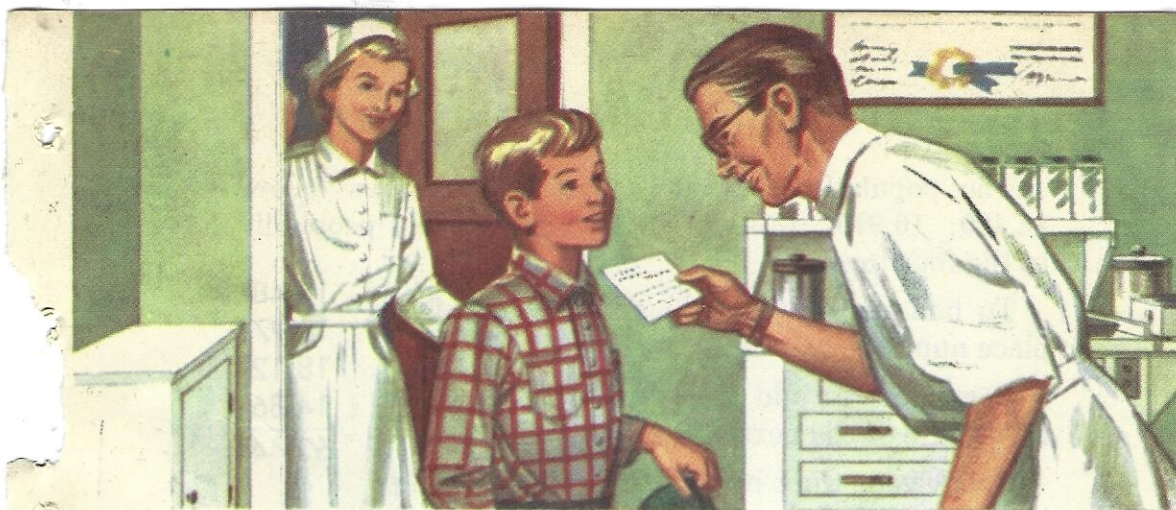
Copy the examples below and add. Check your work.

	A	B	C	D	E
1.	860	473	605	327	926
	597	800	156	432	387
	953	97	750	600	328
	842	125	63	43	79
	771	458	47	487	53
	<u>486</u>	<u>56</u>	<u>395</u>	<u>38</u>	<u>84</u>
2.	40	93	289	860	915
	146	550	347	494	99
	968	463	657	176	645
	580	69	83	208	204
	74	286	623	133	35
	<u>766</u>	<u>37</u>	<u>96</u>	<u>520</u>	<u>71</u>

In the examples below, you will have to carry from ones', tens', and hundreds' columns.

3. Copy the examples. Add and check.

4555	3486	3578	8724	66
5237	7533	2657	2245	9116
1529	1078	7139	8984	755
9346	8794	8260	6009	95
<u>2204</u>	<u>6000</u>	<u>3942</u>	<u>4010</u>	<u>4500</u>



Caring for Your Health

1. David visits the dentist every six months. How many trips does he make to the dentist in one year?
2. David spends five minutes each morning and five minutes each evening brushing his teeth. How many minutes does he spend each week brushing his teeth? This is how many minutes more than one hour?
3. Milk helps to make strong teeth, so David and his brother each drink a quart of milk a day. At 21 cents a quart, what does the milk cost per day? What does it cost in one week?
4. Dorothy knows that it is important to get plenty of rest. She goes to bed at 9 o'clock and gets up at 7 o'clock. How many hours sleep does she get each night?
5. Frank needed a good light on his desk, so he bought a student lamp for \$3.95. How much change did he receive from a five-dollar bill?
6. Ruth gets exercise by walking to school in the morning, and home in the afternoon. She lives $\frac{3}{4}$ mile north, and $\frac{1}{4}$ mile west of her school. How many miles does she walk to and from school in one day? in 5 days? in 4 weeks?

More Column Addition

The population of four towns nearby is as follows:
12,480; 16,975; 18,127; 14,865. How many people live
in the four towns?

To find the answer, you add the four five-
place numbers.

Remember to add the carried figure to the
first figure of the next column.

$$\begin{array}{r} 12,480 \\ 16,975 \\ 18,127 \\ 14,865 \\ \hline 62,447 \end{array}$$

Check your work by adding again. Add up
if you added down the first time. Add down if you
added up the first time. If the sums are not the same,
add again.

Copy, add, and check:

	A	B	C	D
1.	27,009	28,128	71,393	50,040
	87,453	17,680	9,766	49,865
	38,365	26,000	7,440	3,348
	<u>53,893</u>	<u>19,286</u>	<u>12,776</u>	<u>760</u>
2.	23,660	35,457	28,365	716
	75,084	700	28,953	396
	5,477	397	83,480	45,260
	<u>657</u>	<u>44,992</u>	<u>6,495</u>	<u>25,500</u>
3.	4505	3644	710	214
	2180	8543	738	869
	7605	6025	284	421
	3591	6402	861	399
	<u>6525</u>	<u>3793</u>	<u>718</u>	<u>427</u>
			<u>450</u>	<u>152</u>

Subtracting Larger Numbers

1. Turn to page 26 and test yourself again on the subtraction facts. You must know the subtraction facts well, if you are to subtract larger numbers with ease.

2. This year \$350.50 was made at a school sale from the sale of books. Last year the book sale amounted to \$295.75. How much more money was made at the book sale this year?



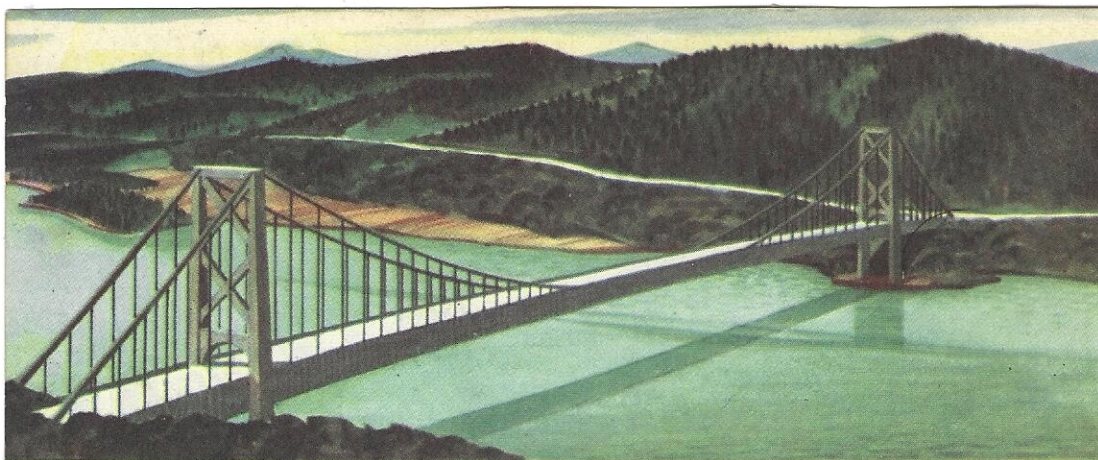
To find the answer to this question, you subtract \$295.75 from \$350.50. Be sure to borrow if the figure in the bottom number is larger than the figure above it. In this example you borrow in each step except the last one.

$$\begin{array}{r} \$350.50 \\ -295.75 \\ \hline \$54.75 \end{array}$$

Check your work by adding the remainder to the number you subtracted. If the work is correct, the sum of these two numbers will be the same as the top number.

Copy, subtract, and check. Remember to put in the dollar sign and the point if needed.

	A	B	C	D	E
3.	\$12,466 <u>1,378</u>	\$849.52 <u>247.86</u>	\$546.31 <u>132.94</u>	\$768.20 <u>516.89</u>	\$349.42 <u>106.58</u>
4.	78,480 <u>14,892</u>	73,000 <u>22,486</u>	57,123 <u>42,876</u>	49,600 <u>15,867</u>	94,334 <u>52,547</u>
5.	58,270 <u>28,695</u>	14,305 <u>9,779</u>	25,794 <u>6,795</u>	12,263 <u>9,567</u>	91,462 <u>33,463</u>



Practice in Subtraction

1. The channel span of a suspension bridge is 1632 feet. How much less than a mile is the channel span of this bridge?
2. Mr. Simmons' new car cost \$2250. The allowance for his old car was \$480. How much did he have to pay in cash for the new car?
3. Mr. Johnson wanted to sell his house for \$24,500. He sold it for \$1800 less than that price. For how much did he sell it?
4. Mr. Ross estimated that the cost of improvements on his home would be \$875. They cost \$1050. This was how much more than his estimate?

Copy the examples below and subtract. Check your work by adding.

	A	B	C	D	E
5.	24,016 <u>14,309</u>	94,225 <u>16,808</u>	36,104 <u>19,426</u>	98,724 <u>34,389</u>	68,731 <u>42,793</u>
6.	622,674 <u>345,287</u>	462,527 <u>274,003</u>	816,148 <u>765,789</u>	969,233 <u>705,579</u>	950,745 <u>761,006</u>

Two Problems in One

Read each problem carefully before you decide what to do.

1. John wants to buy some English stamps that cost \$1.20. If he already has 90¢ and gets 15¢ a week allowance, how many weeks will he have to wait before he can get the stamps?
2. On a trip, a train went 48 miles the first hour, 52 miles the next hour, 54 miles the next hour, and 50 miles the last hour. What was the average speed of the train?
3. White's Store had a sale of gas stoves. They sold 80 stoves at \$175 apiece and 40 stoves at \$120 apiece. How much did the store receive from the sale of these stoves?
4. Roy had \$14.45 in the bank. He added 75 cents one week and 60 cents the next. Then how much money did he have in the bank?
5. Donald's mother made him a clown suit to wear to a costume party. She bought 5 yards of bright blue cloth at 48 cents a yard. Donald bought a red paper hat that cost 25 cents. What was the total cost of Donald's costume?



Adding and Subtracting Money

Copy each of the examples below in straight columns. Remember that there are two places at the right of the point, for cents. Be sure to put the dollar sign and the point in each answer. Check your work.

1. Add:

A	B	C	D	E
\$.04	\$.07	\$1.05	\$3.95	\$6.50
.03	.02	2.80	7.00	.98
.09	.05	.79	1.76	.65
.08	.08	.43	4.50	3.48
<u>.06</u>	.03	<u>8.05</u>	.63	.09
	.09		<u>.47</u>	<u>5.10</u>
	<u>.04</u>			

2. Subtract:

\$633.25	\$800.00	\$482.50	\$904.08	\$263.56
<u>159.58</u>	<u>125.67</u>	<u>294.85</u>	<u>846.98</u>	<u>98.57</u>

Odd and Even Numbers

Beginning with 1, every other number is an **odd number**. Odd numbers cannot be divided evenly by 2. The numbers 5, 17, 29, 31, and 33 are odd numbers. All numbers that end in 1, 3, 5, 7, or 9 are odd numbers.

Beginning with 2, every other number is an **even number**. For example, 6, 14, 22, 38, and 40 are even numbers. Numbers that can be divided evenly by 2 are even numbers. All numbers that end in 0, 2, 4, 6, or 8 are even numbers.

Copy the odd numbers below:

7 18 48 5 11 43 125 102 150 136 300 605

Practice in Multiplying

Write on folded paper the products for the examples below. Check your work. If there are any which are difficult for you, study them until you are sure of the products.

	A	B	C	D	E	F	G	H	I
1.	$\begin{array}{r} 6 \\ 8 \end{array}$	$\begin{array}{r} 9 \\ 7 \end{array}$	$\begin{array}{r} 6 \\ 9 \end{array}$	$\begin{array}{r} 4 \\ 7 \end{array}$	$\begin{array}{r} 8 \\ 3 \end{array}$	$\begin{array}{r} 3 \\ 3 \end{array}$	$\begin{array}{r} 7 \\ 8 \end{array}$	$\begin{array}{r} 9 \\ 9 \end{array}$	$\begin{array}{r} 9 \\ 4 \end{array}$
2.	$\begin{array}{r} 7 \\ 3 \end{array}$	$\begin{array}{r} 8 \\ 6 \end{array}$	$\begin{array}{r} 4 \\ 6 \end{array}$	$\begin{array}{r} 8 \\ 7 \end{array}$	$\begin{array}{r} 8 \\ 4 \end{array}$	$\begin{array}{r} 7 \\ 9 \end{array}$	$\begin{array}{r} 6 \\ 4 \end{array}$	$\begin{array}{r} 8 \\ 8 \end{array}$	$\begin{array}{r} 3 \\ 8 \end{array}$
3.	$\begin{array}{r} 4 \\ 8 \end{array}$	$\begin{array}{r} 6 \\ 7 \end{array}$	$\begin{array}{r} 3 \\ 4 \end{array}$	$\begin{array}{r} 7 \\ 7 \end{array}$	$\begin{array}{r} 9 \\ 3 \end{array}$	$\begin{array}{r} 6 \\ 3 \end{array}$	$\begin{array}{r} 7 \\ 6 \end{array}$	$\begin{array}{r} 8 \\ 9 \end{array}$	$\begin{array}{r} 3 \\ 9 \end{array}$
4.	$\begin{array}{r} 3 \\ 6 \end{array}$	$\begin{array}{r} 4 \\ 4 \end{array}$	$\begin{array}{r} 4 \\ 9 \end{array}$	$\begin{array}{r} 3 \\ 7 \end{array}$	$\begin{array}{r} 9 \\ 6 \end{array}$	$\begin{array}{r} 7 \\ 4 \end{array}$	$\begin{array}{r} 6 \\ 6 \end{array}$	$\begin{array}{r} 9 \\ 8 \end{array}$	$\begin{array}{r} 4 \\ 3 \end{array}$

Copy and multiply. Check your work by multiplying again.

	A	B	C	D	E
5.	$\begin{array}{r} 286 \\ 6 \end{array}$	$\begin{array}{r} 503 \\ 8 \end{array}$	$\begin{array}{r} 956 \\ 7 \end{array}$	$\begin{array}{r} 568 \\ 9 \end{array}$	$\begin{array}{r} 346 \\ 5 \end{array}$
6.	$\begin{array}{r} 2674 \\ 8 \end{array}$	$\begin{array}{r} 6784 \\ 3 \end{array}$	$\begin{array}{r} 7589 \\ 5 \end{array}$	$\begin{array}{r} 5374 \\ 6 \end{array}$	$\begin{array}{r} 3408 \\ 7 \end{array}$
7.	$\begin{array}{r} 43,510 \\ 4 \end{array}$	$\begin{array}{r} 70,925 \\ 2 \end{array}$	$\begin{array}{r} 12,437 \\ 9 \end{array}$	$\begin{array}{r} 31,592 \\ 3 \end{array}$	$\begin{array}{r} 72,689 \\ 4 \end{array}$

Using Two-Place Multipliers

Copy the examples below and multiply. To check your work in Rows 1 and 2, multiply again, this time using the top number as the multiplier.

	A	B	C	D	E	F
1.	$\begin{array}{r} 27 \\ 47 \end{array}$	$\begin{array}{r} 89 \\ 38 \end{array}$	$\begin{array}{r} 68 \\ 62 \end{array}$	$\begin{array}{r} 47 \\ 56 \end{array}$	$\begin{array}{r} 63 \\ 98 \end{array}$	$\begin{array}{r} 92 \\ 21 \end{array}$
2.	$\begin{array}{r} 72 \\ 89 \end{array}$	$\begin{array}{r} 58 \\ 47 \end{array}$	$\begin{array}{r} 69 \\ 74 \end{array}$	$\begin{array}{r} 37 \\ 23 \end{array}$	$\begin{array}{r} 89 \\ 95 \end{array}$	$\begin{array}{r} 61 \\ 53 \end{array}$

In the examples below, there is one more figure in the top number than in the multiplier. In these examples, check your work by multiplying again in the same way.

3.	$\begin{array}{r} 257 \\ 85 \end{array}$	$\begin{array}{r} 395 \\ 36 \end{array}$	$\begin{array}{r} 468 \\ 47 \end{array}$	$\begin{array}{r} 507 \\ 29 \end{array}$	$\begin{array}{r} 793 \\ 84 \end{array}$	$\begin{array}{r} 237 \\ 72 \end{array}$
4.	$\begin{array}{r} 429 \\ 69 \end{array}$	$\begin{array}{r} 648 \\ 28 \end{array}$	$\begin{array}{r} 368 \\ 46 \end{array}$	$\begin{array}{r} 915 \\ 87 \end{array}$	$\begin{array}{r} 824 \\ 53 \end{array}$	$\begin{array}{r} 369 \\ 51 \end{array}$

The examples below contain zeros. If you need help, turn to page 89.

5.	$\begin{array}{r} 80 \\ 80 \end{array}$	$\begin{array}{r} 40 \\ 40 \end{array}$	$\begin{array}{r} 60 \\ 90 \end{array}$	$\begin{array}{r} 350 \\ 50 \end{array}$	$\begin{array}{r} 540 \\ 30 \end{array}$	$\begin{array}{r} 830 \\ 90 \end{array}$
6.	$\begin{array}{r} 408 \\ 60 \end{array}$	$\begin{array}{r} 703 \\ 70 \end{array}$	$\begin{array}{r} 204 \\ 80 \end{array}$	$\begin{array}{r} 706 \\ 50 \end{array}$	$\begin{array}{r} 507 \\ 40 \end{array}$	$\begin{array}{r} 706 \\ 30 \end{array}$

Copy and multiply. Check your work by multiplying again.

	A	B	C	D	E
7.	$\begin{array}{r} 3058 \\ 70 \\ \hline \end{array}$	$\begin{array}{r} 4607 \\ 50 \\ \hline \end{array}$	$\begin{array}{r} 5920 \\ 60 \\ \hline \end{array}$	$\begin{array}{r} 8300 \\ 43 \\ \hline \end{array}$	$\begin{array}{r} 1809 \\ 29 \\ \hline \end{array}$
8.	$\begin{array}{r} 3580 \\ 85 \\ \hline \end{array}$	$\begin{array}{r} 3405 \\ 29 \\ \hline \end{array}$	$\begin{array}{r} 6079 \\ 47 \\ \hline \end{array}$	$\begin{array}{r} 5213 \\ 34 \\ \hline \end{array}$	$\begin{array}{r} 6000 \\ 63 \\ \hline \end{array}$

Using Three-Place Multipliers

Copy and multiply. To check your work, multiply again, this time using the top number as the multiplier.

1.	$\begin{array}{r} 728 \\ 326 \\ \hline \end{array}$	$\begin{array}{r} 924 \\ 581 \\ \hline \end{array}$	$\begin{array}{r} 359 \\ 746 \\ \hline \end{array}$	$\begin{array}{r} 607 \\ 295 \\ \hline \end{array}$	$\begin{array}{r} 580 \\ 851 \\ \hline \end{array}$
2.	$\begin{array}{r} 700 \\ 871 \\ \hline \end{array}$	$\begin{array}{r} 485 \\ 360 \\ \hline \end{array}$	$\begin{array}{r} 830 \\ 450 \\ \hline \end{array}$	$\begin{array}{r} 600 \\ 370 \\ \hline \end{array}$	$\begin{array}{r} 523 \\ 709 \\ \hline \end{array}$
3.	$\begin{array}{r} 490 \\ 906 \\ \hline \end{array}$	$\begin{array}{r} 600 \\ 804 \\ \hline \end{array}$	$\begin{array}{r} 900 \\ 530 \\ \hline \end{array}$	$\begin{array}{r} 240 \\ 407 \\ \hline \end{array}$	$\begin{array}{r} 900 \\ 200 \\ \hline \end{array}$

KEEPING ON YOUR TOES

- Which of the numbers below shows millions?
A. 500,000 B. 5,000,000 C. 5,000,000,000
- Which number shows billions? How many billions does it show?
- A new type factory building may cost one million dollars. How many of these buildings could be built for one billion dollars?

Multiplying Dollars and Cents

Copy and multiply. Remember to place the dollar sign and the point in the product. There will be two places at the right of the point for cents. Check your work.

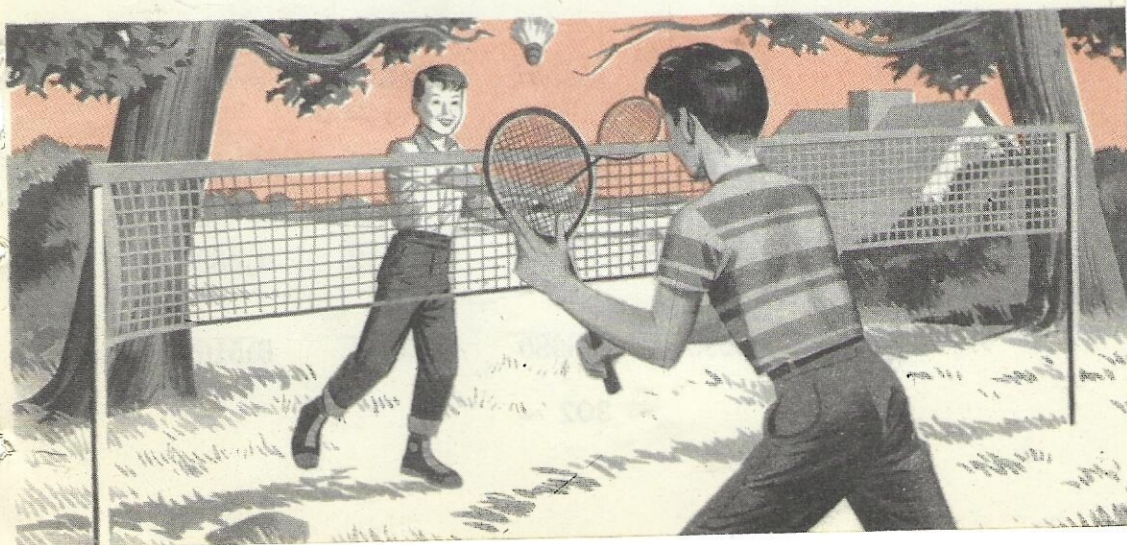
	A	B	C	D	E
1.	$\begin{array}{r} \$38.50 \\ 6 \end{array}$	$\begin{array}{r} \$84.65 \\ 4 \end{array}$	$\begin{array}{r} \$270.90 \\ 8 \end{array}$	$\begin{array}{r} \$436.78 \\ 3 \end{array}$	$\begin{array}{r} \$321.86 \\ 5 \end{array}$
2.	$\begin{array}{r} \$9.75 \\ 25 \end{array}$	$\begin{array}{r} \$7.94 \\ 76 \end{array}$	$\begin{array}{r} \$8.40 \\ 90 \end{array}$	$\begin{array}{r} \$6.05 \\ 70 \end{array}$	$\begin{array}{r} \$7.30 \\ 49 \end{array}$
3.	$\begin{array}{r} \$54.39 \\ 43 \end{array}$	$\begin{array}{r} \$80.40 \\ 75 \end{array}$	$\begin{array}{r} \$65.09 \\ 60 \end{array}$	$\begin{array}{r} \$60.05 \\ 59 \end{array}$	$\begin{array}{r} \$40.36 \\ 68 \end{array}$
4.	$\begin{array}{r} \$5.68 \\ 298 \end{array}$	$\begin{array}{r} \$9.34 \\ 249 \end{array}$	$\begin{array}{r} \$5.09 \\ 376 \end{array}$	$\begin{array}{r} \$6.80 \\ 420 \end{array}$	$\begin{array}{r} \$8.07 \\ 806 \end{array}$

5. In Brown's Men's Shop one coat sells for \$49.50. How much will Mr. Brown receive for 4 of these coats?
6. Mr. Brown sells tennis shoes for \$2.50 a pair. What will he receive for 36 pairs?
7. The rent for the shop is \$185 a month. What is the yearly rent?
8. When he went to the city on a buying trip, Mr. Brown paid \$4.75 a day for a hotel room. If he stayed 6 days, what did he pay for his room?
9. He bought 500 pairs of socks for 49 cents a pair. How much did he pay for these socks?
10. Jim Brown receives from his father a weekly allowance of 35 cents. How much does he receive in a year?

What Does the Question Ask?

Read each problem carefully before you begin to work.
Be sure that you understand the question asked.

1. Frank paid \$6.50 for a tennis racket. His two older brothers each paid \$12.95 for their rackets. What was the total cost of the three tennis rackets?
2. Two groups of children in the Field School gave a school circus. They made \$22.50 from the sale of tickets, \$9.70 from the sale of popcorn, and \$15.00 from the sale of balloons. How much did they make in all?
3. One group of pupils earned \$17.50 from the sale of a school newspaper. Another group earned \$32.25 by giving a play. One group earned how much more than the other?
4. Some of the money earned by the pupils was used to buy one and one-half dozen new balls of different kinds. The total cost of the balls was \$53.10. What was the average cost of the balls?
5. One dozen baseball bats were bought at \$3.25 each. What was the total cost of the bats?
6. Jack and his brother have a new badminton set. The set cost \$24.95, and two extra rackets cost \$7.50 each. What was the total cost of the badminton set and rackets?



Practice in Division

Before you do the examples on this page, you may want to review some of the division facts on page 58.

Copy and divide. Check your work by multiplying. Add the remainder, if any, to the product. If the answer is the same as the dividend, your work is probably correct.

A	B	C	D	E
1. $5\overline{)933}$	$2\overline{)972}$	$6\overline{)5591}$	$8\overline{)3087}$	$3\overline{)2810}$
2. $4\overline{)1077}$	$9\overline{)2550}$	$2\overline{)719}$	$3\overline{)741}$	$7\overline{)4490}$
3. $9\overline{)6831}$	$6\overline{)1724}$	$3\overline{)556}$	$4\overline{)734}$	$8\overline{)1395}$

In the following examples, be sure to write 0 in the proper place in the quotient.

4. $7\overline{)5950}$	$8\overline{)5044}$	$5\overline{)4703}$	$9\overline{)7291}$	$6\overline{)2760}$
5. $9\overline{)5760}$	$7\overline{)1123}$	$2\overline{)1741}$	$4\overline{)1401}$	$7\overline{)6444}$
6. $8\overline{)876}$	$4\overline{)3231}$	$9\overline{)4557}$	$7\overline{)6307}$	$8\overline{)7235}$
7. $6\overline{)2434}$	$9\overline{)6318}$	$4\overline{)1600}$	$8\overline{)2422}$	$5\overline{)1505}$
8. $7\overline{)4961}$	$8\overline{)2003}$	$9\overline{)3690}$	$3\overline{)1712}$	$4\overline{)3880}$
9. $5\overline{)2850}$	$7\overline{)2595}$	$8\overline{)6080}$	$5\overline{)3103}$	$6\overline{)5162}$

Using Two-Place Divisors

Copy the examples below and divide. Check your work.

Remember to write a figure in the quotient each time you use another figure in the dividend.

Set I

A	B	C	D	E
1. $11\overline{)176}$	$22\overline{)489}$	$16\overline{)195}$	$40\overline{)482}$	$23\overline{)485}$
2. $82\overline{)7806}$	$51\overline{)3528}$	$31\overline{)2113}$	$72\overline{)1588}$	$92\overline{)1623}$
3. $25\overline{)1250}$	$34\overline{)1362}$	$60\overline{)3504}$	$83\overline{)2105}$	$72\overline{)4330}$
4. $35\overline{)1370}$	$45\overline{)3255}$	$51\overline{)4600}$	$62\overline{)3625}$	$44\overline{)1820}$

Set II

In the examples below, the divisors end in 6, 7, 8, or 9. Add 1 to the figure in tens' place before you use it as a trial divisor. If you need help, turn to pages 146 and 148.

1. $49\overline{)2828}$	$79\overline{)5903}$	$28\overline{)2030}$	$87\overline{)1690}$	$58\overline{)4352}$
2. $57\overline{)2070}$	$66\overline{)4917}$	$47\overline{)1715}$	$37\overline{)2160}$	$86\overline{)3253}$
3. $89\overline{)4375}$	$48\overline{)1296}$	$39\overline{)3017}$	$29\overline{)2792}$	$59\overline{)3127}$
4. $76\overline{)6051}$	$46\overline{)2569}$	$67\overline{)2500}$	$56\overline{)1656}$	$68\overline{)4055}$
5. $27\overline{)1910}$	$69\overline{)2575}$	$57\overline{)2755}$	$87\overline{)7970}$	$77\overline{)3967}$

Dividing Money

The Stevens School bought 36 folding chairs to use in the auditorium. The total cost of the chairs was \$124.20. What was the cost of one chair?

To find the answer, divide \$124.20 by 36.

You divide dollars and cents just as you divide other numbers. The answer is in dollars and cents, because you are dividing dollars and cents.

Remember to place the dollar sign and the point in the quotient. The point will come directly above the point in the dividend.

When you divide money there may be a remainder, just as in other division examples.

Copy, divide, and check:

A	B	C	D
1. $34 \overline{) \$7.14}$	$26 \overline{) \$11.24}$	$63 \overline{) \$52.95}$	$54 \overline{) \$44.28}$
2. $64 \overline{) \$38.60}$	$46 \overline{) \$24.38}$	$52 \overline{) \$36.98}$	$86 \overline{) \$36.15}$
3. $25 \overline{) \$50.75}$	$32 \overline{) \$89.92}$	$41 \overline{) \$168.92}$	$14 \overline{) \$74.78}$
4. $82 \overline{) \$41.82}$	$35 \overline{) \$14.00}$	$53 \overline{) \$324.36}$	$94 \overline{) \$305.50}$

KEEPING ON YOUR TOES

1. Make a problem in which you must find the average of five numbers.
2. Make a problem in which three people share money equally.
3. To change 2 feet to inches, do you multiply or divide?

Deciding What to Do

Think through each problem carefully before you decide what to do. The question asked in each one will help you decide. Check your work.

1. Fred sold 75 magazines one week, 50 the next week, and 45 during the third week. How many magazines did he sell in the three weeks?
2. A polar bear weighs about 1000 pounds, a black bear about 400 pounds. About how much more does the polar bear weigh?
3. The Crane School ordered new electric clocks that cost \$11.95 apiece. How much did the school pay for 24 of these clocks?
4. The temperature at 9 o'clock on Monday was 20° , on Tuesday 17° , on Wednesday 25° , on Thursday 26° , and on Friday 22° . What was the average temperature at 9 o'clock for the 5 days?
5. One morning the thermometer on the porch read 10° , and the one in the house read 72° . It was how many degrees warmer in the house?
6. John's father paid \$9.00 for a box of 12 typewriter ribbons to use in his office. What was the cost of one?
7. Susan made a Martha Washington costume to wear to a school party. She paid \$3.75 for material for the costume and made a wig out of cotton which she bought for 45 cents. How much did she spend in all?



Practice in Dividing

1. At a school sale the mothers made \$23.75 from the sale of 25 cakes. What was the average amount received for the cakes?
2. One month Mrs. Clark's milk bill read, "24 quarts of milk, \$5.04." What was the price per quart?
3. The pupils in Central School received \$42.00 from the sale of school pennants. Each pennant sold for 75 cents. How many pennants did they sell?
4. The owner of a toy shop paid \$84.00 for 48 dolls. What was the average price of the dolls?

Copy the examples below. Divide and check.

Set I

A	B	C	D	E
1. $33 \overline{)6963}$	$41 \overline{)8695}$	$72 \overline{)9576}$	$53 \overline{)6466}$	$22 \overline{)6955}$
2. $42 \overline{)39354}$	$21 \overline{)5417}$	$54 \overline{)16799}$	$93 \overline{)47802}$	$61 \overline{)43981}$
3. $24 \overline{)13681}$	$34 \overline{)20470}$	$23 \overline{)4692}$	$71 \overline{)36027}$	$92 \overline{)27968}$
4. $63 \overline{)29615}$	$51 \overline{)41320}$	$42 \overline{)30660}$	$34 \overline{)17692}$	$81 \overline{)27540}$
5. $45 \overline{)22500}$	$85 \overline{)25524}$	$24 \overline{)21605}$	$63 \overline{)25200}$	$32 \overline{)25610}$

Set II

1. $28 \overline{)2688}$	$35 \overline{)2387}$	$47 \overline{)1898}$	$58 \overline{)1754}$	$88 \overline{)6205}$
2. $87 \overline{)2251}$	$64 \overline{)2400}$	$73 \overline{)2901}$	$89 \overline{)8196}$	$97 \overline{)5850}$
3. $95 \overline{)5657}$	$29 \overline{)2050}$	$97 \overline{)4388}$	$69 \overline{)3425}$	$78 \overline{)3945}$

Making Sure

Adding, Subtracting, Multiplying, and Dividing

If you make mistakes in these examples, turn to the pages listed for further study and practice.

Copy, work, and check the examples below:

1. Add:

A	B	C	D	E	
525	8465	74,363	27,400	\$8.90	292
496	2734	4,197	30,750	.63	296
85	6006	72,078	528	1.39	
150	655	9,350	4,459	.50	
<u>307</u>	<u>7050</u>			9.10	
				<u>5.06</u>	

2. Subtract:

\$750.62	\$964.35	24,057	684,522	801,500	293
<u>282.76</u>	<u>407.89</u>	<u>8,968</u>	<u>195,754</u>	<u>175,840</u>	294

3. Multiply:

84,735	8654	5486	847	\$60.95	299
<u>5</u>	<u>86</u>	<u>70</u>	<u>392</u>	<u>24</u>	300

4. Divide:

54)4918	67)1876	45)13725	95)\$307.80	53)31800	303
					304
					306

KEEPING ON YOUR TOES

1. If a pie is divided into sixths, each part is $\frac{1}{6}$ of the pie. If two pies are divided into sixths, how many sixths will there be? How many sixths are there in 3 pies?
2. How many eighths can be cut from one cake? 2 cakes?
3. How many halves are there in 6 oranges?

Using Fractions to Show Division

1. If a brick of ice cream is divided among 6 persons, the fraction $\frac{1}{6}$ shows that it has been divided into 6 equal parts.
2. If one waffle is divided equally among four persons, each person gets $\frac{1}{4}$ waffle. The fraction $\frac{1}{4}$ shows that one has been divided by 4.
3. Suppose that 2 waffles are divided equally among four persons. Each person gets $\frac{2}{4}$ waffle. Here the fraction $\frac{2}{4}$ shows that 2 has been divided by 4. This fraction, reduced to lowest terms, is $\frac{1}{2}$. Each person receives $\frac{1}{2}$ waffle.
4. Miss Thomas drew a line 3 feet long on the blackboard. She divided it into 6 equal parts. How long was each of the parts? $3 \text{ feet} \div 6 = \frac{3}{6}$, or $\frac{1}{2}$ foot.
5. Fred divided 2 yards of cord into 8 equal parts to use in making different kinds of knots. Each piece of cord was what part of a yard in length?

$$2 \text{ yards} \div 8 = \frac{2}{8}, \text{ or } \frac{1}{4} \text{ yard.}$$

6. Write the fraction that shows each person's share if the following are divided equally:
 - A. 1 pie among 5 persons
 - B. 3 sandwiches among 4 persons
 - C. 2 candy bars among 6 boys
 - D. 4 peaches among 8 children

Write each of the following as a fraction. If possible, reduce the fraction to lowest terms.

- | | A | B | C | D |
|-----|-----------------|-----------------|------------------|------------------|
| 7. | $4 \div 5 = ?$ | $6 \div 8 = ?$ | $8 \div 10 = ?$ | $6 \div 12 = ?$ |
| 8. | $3 \div 8 = ?$ | $4 \div 6 = ?$ | $12 \div 15 = ?$ | $3 \div 9 = ?$ |
| 9. | $4 \div 16 = ?$ | $8 \div 12 = ?$ | $6 \div 18 = ?$ | $4 \div 7 = ?$ |
| 10. | $6 \div 24 = ?$ | $4 \div 20 = ?$ | $10 \div 20 = ?$ | $18 \div 24 = ?$ |

Writing Remainders as Fractions

1. Jerry had 5 apples which he divided equally with his brother. How many apples did each boy have?



Jerry and his brother each had two whole apples, and there was one left over. When this apple was divided, each boy had $\frac{1}{2}$ of it.

$$\begin{array}{r} 2\frac{1}{2} \\ 2 \overline{)5} \\ \underline{4} \\ 1 \end{array}$$

When we divide, there is a remainder of 1. This remainder, 1, is $\frac{1}{2}$ of the divisor, 2. We write the fraction $\frac{1}{2}$ after the 2 in the quotient.



2. If 10 jelly sandwiches are divided equally among 4 boys, how many does each boy have?

The drawings above show that each boy has 2 sandwiches and that there are 2 sandwiches left. They also show $2 \div 4 = \frac{2}{4}$, or $\frac{1}{2}$. Each boy has $2\frac{1}{2}$ sandwiches.

$$\begin{array}{r} 2\frac{2}{4} = 2\frac{1}{2} \\ 4 \overline{)10} \\ \underline{8} \\ 2 \end{array}$$

Copy and divide. Write each remainder as a fraction in lowest terms.

A	B	C	D	E
3. $6 \overline{)7}$	$4 \overline{)18}$	$7 \overline{)23}$	$6 \overline{)40}$	$8 \overline{)38}$
4. $8 \overline{)698}$	$7 \overline{)508}$	$9 \overline{)831}$	$4 \overline{)275}$	$6 \overline{)434}$

5. What is each person's share if these are divided equally:

- Seven candy bars among 4 boys
- Four bananas among 3 persons
- Eight sticks of candy among 6 girls
- Five hamburgers among 5 children

Sensible Remainders

1. One morning James gathered 57 eggs. He put them into cartons which would hold a dozen eggs each. How many dozen eggs did he have?

In this example, you write the remainder $\frac{9}{12}$ as a fraction. Reduced to lowest terms, $\frac{9}{12} = \frac{3}{4}$.

$$\frac{4\frac{9}{12}}{12 \overline{)57}} = 4\frac{3}{4}$$

$$\begin{array}{r} 12 \overline{)57} \\ \underline{48} \\ 9 \end{array}$$

James had $4\frac{3}{4}$ dozen eggs.

2. Bob had 73 marbles which he divided equally among 10 boys. How many marbles did each boy receive?

In this example the remainder, 3, means 3 marbles. Can 3 marbles be divided among 10 boys? Would it be sensible to say that each boy got $7\frac{3}{10}$ marbles? Or would it be sensible to say that each boy got 7 marbles and that there were 3 extra marbles?

$$\begin{array}{r} 7 \text{ R}3 \\ 10 \overline{)73} \\ \underline{70} \\ 3 \end{array}$$

In Problem 1, it was reasonable to write the remainder as a fraction. In Problem 2, the remainder should not be written as a fraction. Write it this way: R3.

► Whether it is sensible to think of the remainder as a fraction depends upon the problem. You write the remainder as a fraction only when it is sensible to do so.

In the following problems, write the remainders as fractions when it is sensible to do so:

3. The 29 boys on the playground formed 4 teams of equal number. How many boys were on a team?
4. Twelve watermelons weighed 342 pounds. What was the average weight of the melons?
5. James had \$1.15. He bought U.S. Savings Stamps at 25 cents each. How many stamps did he buy?



Finding the Cost

1. At Mr. Strickland's market you can buy 3 pounds of grapes for 25 cents. At that price, what is the cost of one pound?

To find the answer, you divide 25 cents by 3.
The cost of 1 pound of grapes is $8\frac{1}{3}$ cents.
Since you cannot pay $\frac{1}{3}$ of a cent, Mr. Strickland charges 9 cents if you buy only 1 pound.

$$\begin{array}{r} 8\frac{1}{3}\text{¢} \\ 3 \overline{)25\text{¢}} \end{array}$$

2. Marie bought $\frac{1}{2}$ pound of salted nuts. The nuts sold for 89 cents a pound. How much did she have to pay?

3. Three large cakes of soap sell for 29 cents. At that rate, what would be the cost of one cake?

4. Sometimes Mr. Strickland sells two cans of frozen orange juice for 49 cents. At that rate, what would be the cost of one can?

5. How much more does he get for two cans of frozen orange juice sold to two customers than for two cans sold to the same customer?

6. Four large bars of a certain kind of soap sell for \$1.50. At that rate, what is the cost of each bar of this soap?

7. Eight cans of pineapple juice sell for \$1.00. At that rate, what would be the cost of 1 can?

Problems of More Than One Step

Only one question is asked in each of the following problems, but one or more other questions must be found and answered first.

1. The Martin family traveled 1090 miles in 4 days when driving from their home to their cottage on Cape Cod. They drove 298 miles the first day, 314 miles the second day, and 324 the third day. How many miles did they drive the fourth day?

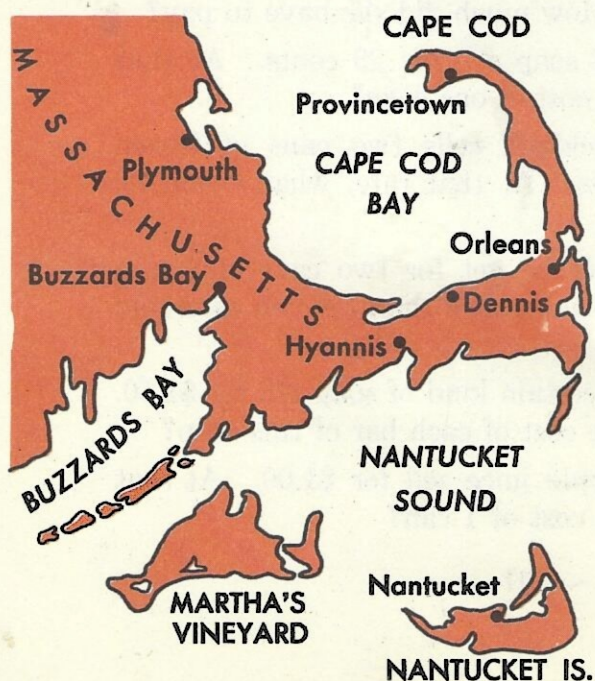
2. One day they drove 67 miles from Buzzards Bay to Provincetown. It is 29 miles from Buzzards Bay to Dennis, and 12 miles from Dennis to Orleans. What is the distance from Orleans to Provincetown?

3. They saw one lighthouse beacon which flashes every five seconds. How many times does it flash in an hour?

4. While on Cape Cod they visited a shop where bay-berry candles are made. Jane and her mother bought 2 pairs of candles at \$1.25 each, and 2 pairs at 75 cents

each. How much change did they receive from a \$10 bill?

5. The family took a boat trip from Hyannis to Nantucket Island. Mr. and Mrs. Martin's round-trip tickets cost \$4.95 each. Jane's and David's tickets cost \$2.50 each. What was the total cost of the tickets?



Keeping in Practice

Copy, add, and check:

	A	B	C	D	E
1.	$\frac{2}{5}$ $\frac{1}{5}$ 	$\frac{3}{8}$ $\frac{3}{8}$ 	$\frac{5}{6}$ $\frac{1}{6}$ 	$\frac{7}{12}$ $\frac{11}{12}$ 	$\frac{1}{2}$ $\frac{1}{8}$
2.	$\frac{1}{3}$ $\frac{5}{6}$ 	$5\frac{9}{16}$ $3\frac{9}{16}$ 	5 $\frac{1}{4}$ $\frac{1}{12}$ 	$7\frac{3}{4}$ $\frac{1}{4}$ 	$4\frac{5}{8}$ $5\frac{3}{4}$

Copy, subtract, and check:

3.	$\frac{7}{8}$ $\frac{5}{8}$ 	$\frac{4}{5}$ $\frac{1}{5}$ 	$7\frac{1}{2}$ $\frac{1}{2}$ 	$9\frac{7}{12}$ $\frac{1}{2}$ 	$8\frac{2}{3}$ 5
4.	$12\frac{7}{16}$ $7\frac{3}{16}$ 	$15\frac{7}{10}$ $\frac{1}{5}$ 	$28\frac{5}{6}$ $14\frac{1}{6}$ 	$17\frac{3}{10}$ $8\frac{3}{10}$ 	$11\frac{1}{2}$ $7\frac{5}{12}$

5. Copy these mixed numbers and write the correct numerator in place of each question mark:

A. $1\frac{4}{5} = 1\frac{?}{10}$ B. $2\frac{2}{3} = 2\frac{?}{6}$ C. $3\frac{5}{8} = 3\frac{?}{16}$

6. Which of the following fractions are in lowest terms?

$\frac{6}{8}$ $\frac{1}{2}$ $\frac{3}{4}$ $\frac{1}{3}$ $\frac{8}{12}$ $\frac{6}{10}$ $\frac{3}{10}$ $\frac{4}{16}$ $\frac{4}{5}$

7. Which is the largest fraction? Which fraction is the smallest? $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{5}$ $\frac{1}{6}$ $\frac{1}{8}$

8. A. What is $\frac{1}{8}$ of \$64? B. What is $\frac{1}{5}$ of \$25?

9. Write these numbers in figures: fifteen and seven-twelfths; eleven and nine-sixteenths.

10. Divide 17 by 5. Write the remainder as a fraction.

11. Divide 76 by 8. Write the remainder as a fraction, reduced to lowest terms.

Getting Ready for Short Division

When the divisor is a one-place number, you can divide in a short way called **short division**.

Before you learn to work short division examples, you must be able to subtract accurately.

It is as easy to subtract 32 from 34 as to subtract 2 from 4. The remainder is 2.

All of the examples below will be easy, for each is similar to, or like, a subtraction fact that you already know. Write the remainders on folded paper.

	A	B	C	D	E	F	G	H	I
1.	$\begin{array}{r} 34 \\ 32 \\ \hline \end{array}$	$\begin{array}{r} 28 \\ 25 \\ \hline \end{array}$	$\begin{array}{r} 25 \\ 21 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ 16 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 12 \\ \hline \end{array}$	$\begin{array}{r} 41 \\ 40 \\ \hline \end{array}$	$\begin{array}{r} 46 \\ 45 \\ \hline \end{array}$	$\begin{array}{r} 66 \\ 63 \\ \hline \end{array}$	$\begin{array}{r} 76 \\ 72 \\ \hline \end{array}$
2.	$\begin{array}{r} 78 \\ 72 \\ \hline \end{array}$	$\begin{array}{r} 59 \\ 54 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 10 \\ \hline \end{array}$	$\begin{array}{r} 89 \\ 81 \\ \hline \end{array}$	$\begin{array}{r} 47 \\ 40 \\ \hline \end{array}$	$\begin{array}{r} 37 \\ 32 \\ \hline \end{array}$	$\begin{array}{r} 29 \\ 25 \\ \hline \end{array}$	$\begin{array}{r} 57 \\ 54 \\ \hline \end{array}$	$\begin{array}{r} 68 \\ 64 \\ \hline \end{array}$
3.	$\begin{array}{r} 73 \\ 72 \\ \hline \end{array}$	$\begin{array}{r} 84 \\ 81 \\ \hline \end{array}$	$\begin{array}{r} 38 \\ 35 \\ \hline \end{array}$	$\begin{array}{r} 74 \\ 72 \\ \hline \end{array}$	$\begin{array}{r} 69 \\ 64 \\ \hline \end{array}$	$\begin{array}{r} 18 \\ 14 \\ \hline \end{array}$	$\begin{array}{r} 59 \\ 56 \\ \hline \end{array}$	$\begin{array}{r} 45 \\ 42 \\ \hline \end{array}$	$\begin{array}{r} 82 \\ 81 \\ \hline \end{array}$
4.	$\begin{array}{r} 27 \\ 21 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ 12 \\ \hline \end{array}$	$\begin{array}{r} 65 \\ 64 \\ \hline \end{array}$	$\begin{array}{r} 44 \\ 40 \\ \hline \end{array}$	$\begin{array}{r} 19 \\ 18 \\ \hline \end{array}$	$\begin{array}{r} 31 \\ 30 \\ \hline \end{array}$	$\begin{array}{r} 29 \\ 28 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ 15 \\ \hline \end{array}$	$\begin{array}{r} 38 \\ 36 \\ \hline \end{array}$
5.	$\begin{array}{r} 15 \\ 14 \\ \hline \end{array}$	$\begin{array}{r} 28 \\ 27 \\ \hline \end{array}$	$\begin{array}{r} 39 \\ 36 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 10 \\ \hline \end{array}$	$\begin{array}{r} 27 \\ 24 \\ \hline \end{array}$	$\begin{array}{r} 24 \\ 21 \\ \hline \end{array}$	$\begin{array}{r} 35 \\ 30 \\ \hline \end{array}$	$\begin{array}{r} 47 \\ 45 \\ \hline \end{array}$	$\begin{array}{r} 21 \\ 20 \\ \hline \end{array}$
6.	$\begin{array}{r} 83 \\ 81 \\ \hline \end{array}$	$\begin{array}{r} 49 \\ 48 \\ \hline \end{array}$	$\begin{array}{r} 65 \\ 63 \\ \hline \end{array}$	$\begin{array}{r} 32 \\ 30 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ 14 \\ \hline \end{array}$	$\begin{array}{r} 19 \\ 16 \\ \hline \end{array}$	$\begin{array}{r} 43 \\ 42 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 10 \\ \hline \end{array}$	$\begin{array}{r} 69 \\ 63 \\ \hline \end{array}$
7.	$\begin{array}{r} 36 \\ 35 \\ \hline \end{array}$	$\begin{array}{r} 29 \\ 27 \\ \hline \end{array}$	$\begin{array}{r} 66 \\ 64 \\ \hline \end{array}$	$\begin{array}{r} 19 \\ 15 \\ \hline \end{array}$	$\begin{array}{r} 39 \\ 35 \\ \hline \end{array}$	$\begin{array}{r} 29 \\ 24 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ 12 \\ \hline \end{array}$	$\begin{array}{r} 48 \\ 45 \\ \hline \end{array}$	$\begin{array}{r} 26 \\ 25 \\ \hline \end{array}$

The examples on the lower part of this page are a little more difficult than those on page 314. In the examples below, the figure in tens' place in the smaller number is one less than the figure in tens' place in the larger number.

Study the examples at the right.
You know that $11 - 4 = 7$. $31 - 24$
is like $11 - 4$. Then, $31 - 24 = 7$.

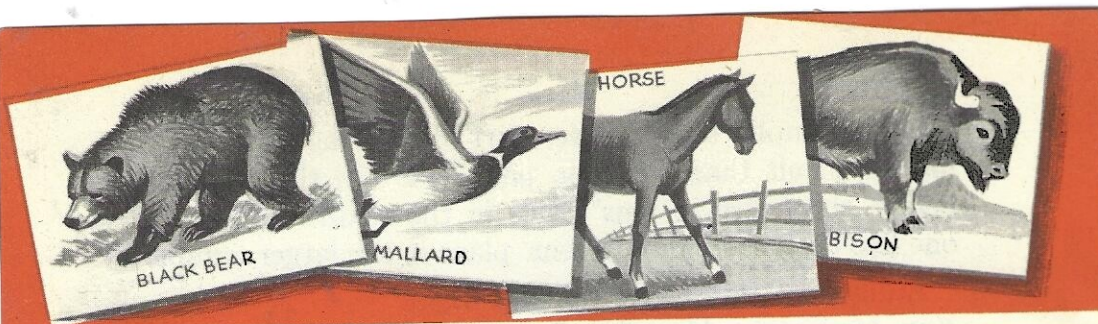
$$\begin{array}{r} 11 \\ - 4 \\ \hline \end{array} \quad \begin{array}{r} 31 \\ - 24 \\ \hline \end{array}$$

What is the remainder when you subtract 7 from 15? When you subtract 27 from 35?

$$\begin{array}{r} 15 \\ - 7 \\ \hline \end{array} \quad \begin{array}{r} 35 \\ - 27 \\ \hline \end{array}$$

Each of the examples below is like a subtraction fact that you know. Subtract, and write the remainders on folded paper.

	A	B	C	D	E	F	G	H	I	J
8.	$\begin{array}{r} 26 \\ 18 \end{array}$	$\begin{array}{r} 31 \\ 24 \end{array}$	$\begin{array}{r} 40 \\ 35 \end{array}$	$\begin{array}{r} 50 \\ 49 \end{array}$	$\begin{array}{r} 62 \\ 54 \end{array}$	$\begin{array}{r} 23 \\ 18 \end{array}$	$\begin{array}{r} 80 \\ 72 \end{array}$	$\begin{array}{r} 71 \\ 63 \end{array}$	$\begin{array}{r} 35 \\ 27 \end{array}$	$\begin{array}{r} 55 \\ 49 \end{array}$
9.	$\begin{array}{r} 44 \\ 36 \end{array}$	$\begin{array}{r} 20 \\ 14 \end{array}$	$\begin{array}{r} 40 \\ 36 \end{array}$	$\begin{array}{r} 52 \\ 48 \end{array}$	$\begin{array}{r} 34 \\ 28 \end{array}$	$\begin{array}{r} 20 \\ 16 \end{array}$	$\begin{array}{r} 63 \\ 56 \end{array}$	$\begin{array}{r} 32 \\ 28 \end{array}$	$\begin{array}{r} 41 \\ 36 \end{array}$	$\begin{array}{r} 52 \\ 49 \end{array}$
10.	$\begin{array}{r} 62 \\ 56 \end{array}$	$\begin{array}{r} 34 \\ 27 \end{array}$	$\begin{array}{r} 51 \\ 48 \end{array}$	$\begin{array}{r} 20 \\ 18 \end{array}$	$\begin{array}{r} 22 \\ 16 \end{array}$	$\begin{array}{r} 61 \\ 56 \end{array}$	$\begin{array}{r} 53 \\ 48 \end{array}$	$\begin{array}{r} 30 \\ 24 \end{array}$	$\begin{array}{r} 50 \\ 48 \end{array}$	$\begin{array}{r} 71 \\ 64 \end{array}$
11.	$\begin{array}{r} 53 \\ 45 \end{array}$	$\begin{array}{r} 25 \\ 18 \end{array}$	$\begin{array}{r} 32 \\ 27 \end{array}$	$\begin{array}{r} 21 \\ 18 \end{array}$	$\begin{array}{r} 60 \\ 54 \end{array}$	$\begin{array}{r} 41 \\ 35 \end{array}$	$\begin{array}{r} 61 \\ 54 \end{array}$	$\begin{array}{r} 54 \\ 48 \end{array}$	$\begin{array}{r} 21 \\ 16 \end{array}$	$\begin{array}{r} 31 \\ 28 \end{array}$
12.	$\begin{array}{r} 50 \\ 45 \end{array}$	$\begin{array}{r} 22 \\ 18 \end{array}$	$\begin{array}{r} 43 \\ 36 \end{array}$	$\begin{array}{r} 54 \\ 49 \end{array}$	$\begin{array}{r} 70 \\ 63 \end{array}$	$\begin{array}{r} 51 \\ 45 \end{array}$	$\begin{array}{r} 30 \\ 27 \end{array}$	$\begin{array}{r} 33 \\ 28 \end{array}$	$\begin{array}{r} 23 \\ 16 \end{array}$	$\begin{array}{r} 42 \\ 36 \end{array}$
13.	$\begin{array}{r} 70 \\ 64 \end{array}$	$\begin{array}{r} 33 \\ 27 \end{array}$	$\begin{array}{r} 53 \\ 49 \end{array}$	$\begin{array}{r} 30 \\ 28 \end{array}$	$\begin{array}{r} 24 \\ 18 \end{array}$	$\begin{array}{r} 51 \\ 49 \end{array}$	$\begin{array}{r} 31 \\ 27 \end{array}$	$\begin{array}{r} 52 \\ 45 \end{array}$	$\begin{array}{r} 60 \\ 56 \end{array}$	$\begin{array}{r} 55 \\ 48 \end{array}$



Short Division

Dan has 288 pictures of animals. He is putting them into an album with 6 pictures on a page. How many pages can he fill?

To find the answer, divide 288 by 6. We divide as we have before, but we use short division. Think, how many 6's in 28?

We write the 4 above the 8 of the 28 and multiply 6 by 4, but we do not write the 24.

$$\begin{array}{r} 48 \\ 6 \overline{)288} \end{array}$$

We subtract the 24 from the 28 mentally, and remember that we have a remainder of 4. Now we think of the 4 and the 8 as making 48. How many 6's in 48? We write the 8 above the 8 in the dividend.

1. Explain how these examples are worked by short division:

A

$$\begin{array}{r} 18 \\ 5 \overline{)90} \end{array}$$

B

$$\begin{array}{r} 53 \\ 8 \overline{)424} \end{array}$$

C

$$\begin{array}{r} 42 \text{ R}5 \\ 6 \overline{)257} \end{array}$$

D

$$\begin{array}{r} 76 \text{ R}3 \\ 7 \overline{)535} \end{array}$$

Use short division in working the following examples:

A

$$2. \begin{array}{r} 3 \overline{)84} \end{array}$$

B

$$5 \overline{)340}$$

C

$$7 \overline{)221}$$

D

$$8 \overline{)549}$$

E

$$7 \overline{)325}$$

3. $6 \overline{)205}$

$5 \overline{)295}$

$8 \overline{)635}$

$4 \overline{)214}$

$6 \overline{)515}$

4. $8 \overline{)329}$

$9 \overline{)307}$

$7 \overline{)177}$

$9 \overline{)715}$

$6 \overline{)585}$

Practice in Short Division

1. In 7 trips in his car, Mr. Henderson drove a total of 2415 miles. How many miles did he average on a trip? $2415 \div 7 = ?$

Now, there will be 3 figures in the quotient, but you use short division, just as you did before.

$$\begin{array}{r} 345 \\ 7 \overline{)2415} \end{array}$$

How many 7's in 24? Write 3 above the 4 in the dividend.

Without writing, subtract 21 from 24. Think of the remainder, 3, together with the next figure, 1. The number is 31.

How many 7's in 31? Write 4 above the 1 in the dividend.

Without writing, subtract 28 from 31. Think of the remainder, 3, with the 5 in the dividend, as 35.

How many 7's in 35? Write 5 above the 5 in the dividend.

$$\begin{array}{r} 345 \\ 7 \overline{)2415} \\ 21 \end{array}$$

Mr. Henderson's trips averaged 345 miles.

2. At the right, the example is worked by long division. You see that when you use short division, you do all of the multiplying and subtracting, but do not write it.

$$\begin{array}{r} 345 \\ 7 \overline{)2415} \\ \underline{21} \\ 31 \\ \underline{28} \\ 35 \\ \underline{35} \end{array}$$

Work the examples below by short division:

A	B	C	D	E
3. $4 \overline{)1077}$	$5 \overline{)1974}$	$7 \overline{)4575}$	$8 \overline{)6076}$	$6 \overline{)3252}$
4. $3 \overline{)535}$	$7 \overline{)1988}$	$8 \overline{)4808}$	$6 \overline{)4324}$	$3 \overline{)2897}$
5. $5 \overline{)3600}$	$8 \overline{)3841}$	$6 \overline{)5160}$	$7 \overline{)6351}$	$9 \overline{)8390}$
6. $9 \overline{)5769}$	$6 \overline{)5400}$	$4 \overline{)3496}$	$9 \overline{)5285}$	$5 \overline{)4329}$

Comparing Numbers

Supply the fraction or whole number which is missing in each problem.

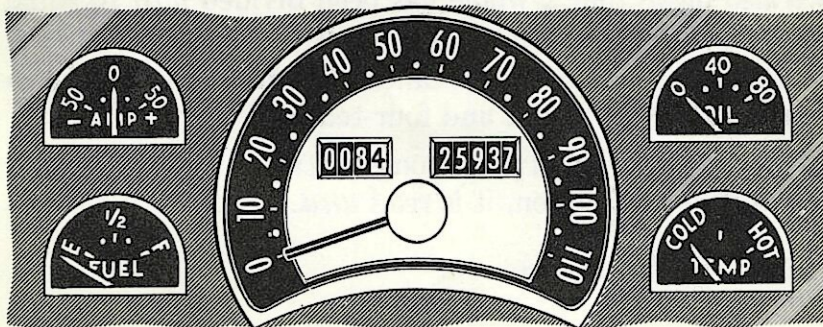
1. Frank has 6 marbles. John has 18 marbles. John has ? times as many marbles as Frank.
2. Forty cents is ? times as much as 10 cents.
3. Ten cents is ? as much as fifty cents.
4. Helen weighs 60 pounds. Her little sister weighs 30 pounds. Helen weighs ? times as much as her sister.
5. A quarter is ? as much as fifty cents.
6. One gallon is ? times as much as a quart.
7. Forty-five minutes is ? times as long as 15 minutes.
8. Ten minutes is ? of an hour.
9. Virginia had 40 cents. She spent 5 cents for a candy bar. She spent ? of her money.
10. Thirty-five cents is ? times as much as 7 cents.
11. It took Mr. Peterson 1 hour to go to the city by train. He spent 15 minutes of this time reading his paper. He spent ? of an hour reading.
12. James mailed one package for 33 cents and another for 11 cents. The first cost ? times as much as the second.
13. Six cents is ? as much as 48 cents.
14. Forty-eight cents is ? times as much as 6 cents.
15. Four inches is ? of a foot.
16. Twelve inches is ? times as much as 4 inches.
17. Jack is 16 years old. His brother is 8 years old. Jack is ? times as old as his brother.

LEARNING ABOUT DECIMALS

The Meaning of Tenths

On an automobile trip, Jerry likes to watch the speedometer of the car. Then he knows how fast the car is traveling.

He also watches the two **odometers**, which measure the number of miles a car travels. The one at the right shows the total number of miles the car has traveled. The one at the left can be set at 0 so that one can tell the number of miles covered in any one trip.



Jerry knows that the figure 4, at the left, stands for tenths of a mile. This figure changes 10 times as the car is driven one mile. It is 1, then 2, then 3, then 4, and so on. But the figure is read "one-tenth," "two-tenths," and so on, because it means tenths of a mile. The trip odometer at the left in the picture shows that on this trip the car has been driven 8 and $\frac{4}{10}$ miles.

When the car has gone $\frac{6}{10}$ of a mile farther, the figure at the right will be 0, and the whole number 8 will change to 9. Add $8\frac{4}{10}$ and $\frac{6}{10}$. Is the sum 9?

Another way to write $8\frac{4}{10}$ is 8.4. When a fraction has the denominator 10, we can leave off the denominator of the fraction and place a point in front of the numerator.

The point is called a **decimal point**. It shows that the 8 is a whole number and that the .4 is a fraction.

We read .4 just as we read $\frac{4}{10}$. Each is read "four-tenths." Both .4 and $\frac{4}{10}$ have the same meaning.

The fraction $\frac{4}{10}$ is called a **common fraction**, or just a **fraction**. The fraction .4 is called a **decimal fraction**, or simply a **decimal**.

You can easily tell what decimal fractions mean if you know what common fractions mean. The common fraction $\frac{4}{10}$ means that a whole is divided into 10 equal parts, and that we are talking about 4 of them. When we write .4 we also mean that a whole has been divided into 10 equal parts, and that we are talking about 4 of them.

The mixed number 8.4 is called a **decimal mixed number**. It is read "eight and four-tenths."

► When the decimal point comes between a whole number and a decimal fraction, it is read **and**.

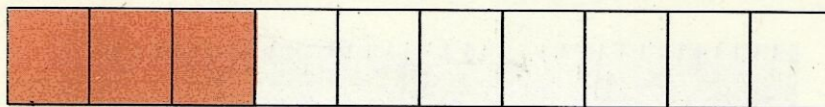
Read the following:

A	B	C
1. .5 yd.	.6 mi.	40.9 yd.
2. .2 mi.	2.8 in.	25.7 mi.
3. .4 in.	5.3 mi.	16.6 ft.

Read each number below. Tell whether it contains a common fraction or a decimal fraction.

A	B	C	D	E	F
4. $1\frac{5}{10}$	5.7	6.2	$11\frac{3}{10}$	$5\frac{9}{10}$	$2\frac{4}{10}$
5. 3.1	4.3	3.5	14.6	$12\frac{8}{10}$	7.9
6. 2.8	$8\frac{2}{10}$	9.4	$15\frac{7}{10}$	18.9	$20\frac{3}{10}$

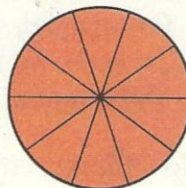
Writing Decimal and Common Fractions



1. Write the decimal fraction which tells what part of the figure above is colored.

2. Write the common fraction which tells what part of the figure above is white.

3. Ruth cut a cake into 10 equal pieces. Each piece was what part of the whole cake? Write the answer as a fraction and as a decimal.



4. Write the following as decimal fractions:

$\frac{6}{10}$ $\frac{1}{10}$ $\frac{7}{10}$ $\frac{4}{10}$ $\frac{8}{10}$ $\frac{3}{10}$ $\frac{5}{10}$ $\frac{9}{10}$ $\frac{2}{10}$

5. Write the following as decimal mixed numbers:

A. $4\frac{2}{10}$ C. $9\frac{1}{10}$ E. $18\frac{5}{10}$ G. $11\frac{3}{10}$ I. $15\frac{6}{10}$
 B. $6\frac{8}{10}$ D. $12\frac{7}{10}$ F. $7\frac{4}{10}$ H. $8\frac{9}{10}$ J. $20\frac{1}{10}$

6. Write the following as mixed numbers with common fractions, and reduce the fractions to lowest terms. For example, $8.2 = 8\frac{2}{10} = 8\frac{1}{5}$.

A. 6.6 mi. C. 17.5 min. E. 5.2 in. G. 10.4 sec.
 B. 8.4 lb. D. 12.8 oz. F. 9.4 yd. H. 7.5 in.

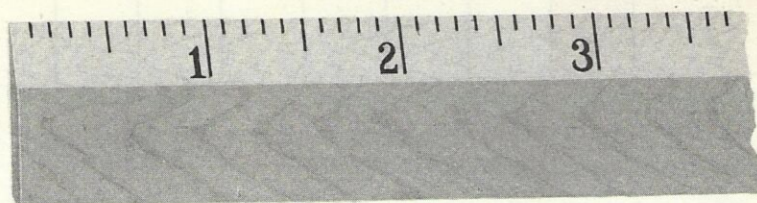
7. Ten children were invited to Ruth's party, but only nine children could come. This was what fractional part of the group? Write the fraction in two ways.

8. Fred lives $.5$ mile from school and Ralph lives $\frac{7}{10}$ mile from school. Which boy has the greater distance to walk?

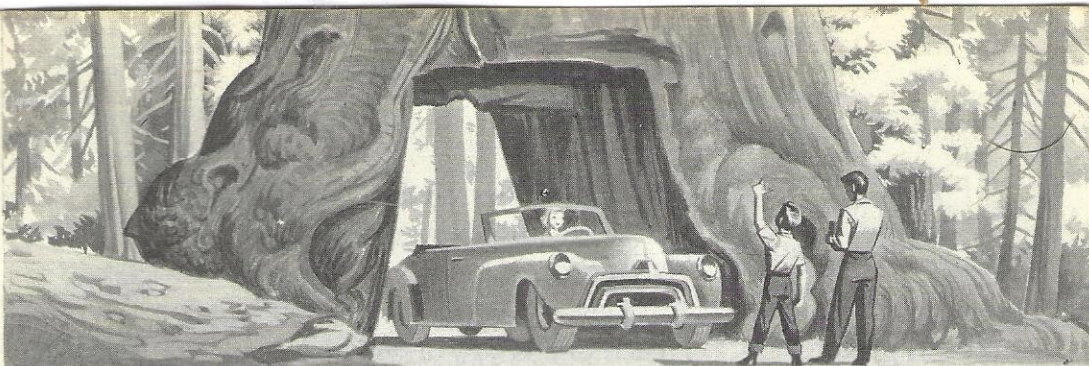
9. In the following numbers, write the fractions as decimals, and the decimals as fractions:

$\frac{9}{10}$ $.3$ 4.1 $3\frac{7}{10}$ $2\frac{3}{10}$ 6.5

Using a Ruler to Measure Tenths



1. The ruler pictured above is a kind which is sometimes used for special measurements. Into how many equal parts is each inch divided? What is each part called? Write the name of each part as a fraction and as a decimal.
2. How many tenths of an inch are there in $\frac{1}{2}$ inch? Write your answer as a fraction and as a decimal.
3. Study the pairs of numbers written below. Copy the longer measure in each pair.
 - A. 1.5 in. or 1.8 in.
 - C. 2 in. or .2 in.
 - B. 1.3 in. or 2.1 in.
 - D. .4 in. or .8 in.
4. How many tenths of an inch are there in 1 inch? How many are there in 6 inches? in 1.6 inches?
5. Fifteen-tenths inches equal how many inches?
6. Place a piece of folded paper on the ruler above and measure the following lengths. Make a short line on the paper to show the end of each measure.
 - A. 1.8 inches
 - C. 2.1 inches
 - E. 3.3 inches
 - B. 1.5 inches
 - D. 2.7 inches
 - F. .6 inch
7. Which is more, $1\frac{4}{10}$ in. or $1\frac{1}{2}$ in.?
8. Write .2 as a common fraction and reduce it to lowest terms.



Giant Sequoia Trees

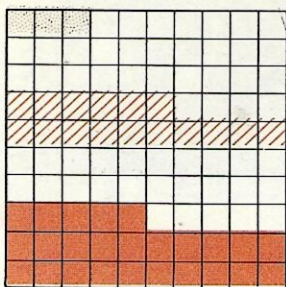
In Yosemite National Park, there is a grove of about 200 giant sequoia trees.

NAME OF THE TREE	DISTANCE AROUND THE BASE IN FEET	HEIGHT IN FEET
Grizzly Giant	96.5	209
Faithful Couple	96.8	248
Columbia	88.1	286
Lafayette	96.1	271
Washington	93.5	235
Wawona (tunnel tree)	86.4	234
Virginia	89.3	182
Clothespin	69.6	266
California (tunnel tree)	78.1	232

The table above gives two dimensions of the largest trees. Read the table and answer the following questions:

1. Which tree measures the greatest number of feet around the base? What is the distance around the base? What is the height of this tree?
2. Which tree is smallest at the base? What is the distance around the base of this tree? What is its height?
3. What is the distance around the base of the Washington? the Lafayette? the Columbia? the Grizzly Giant?
4. What is the difference in height between the tallest and shortest tree?

Reading and Writing Hundredths



1. The large square at the left is divided into how many equal small squares?

Since there are 100 small squares, each one is $\frac{1}{100}$ of the large square.

2. How many hundredths of the large square are dotted?

3. How many hundredths have slanting lines?

You have learned that fractions which have the denominator 10 can be written as decimals. If the denominator of a fraction is 100, the fraction can also be written as a decimal. We can write $\frac{25}{100}$ as .25 and $\frac{16}{100}$ as .16.

We read .25 just as we read $\frac{25}{100}$. Each is read "twenty-five hundredths." Also, .16 or $\frac{16}{100}$ is read "sixteen-hundredths."

► If the decimal fraction is **tenths**, there is only *one figure at the right of the decimal point*.

► If the decimal fraction is **hundredths**, there are always *two figures at the right of the decimal point*.

4. Now look at the large square above again. How many small squares are a solid color? This is what part of the large square?

To write $\frac{3}{100}$ as a decimal, we must write a zero to the right of the decimal point, because we must have two places for hundredths. We write .03, not .3. The 0 shows that there are no tenths.

Read the following decimals:

- | | | | | | |
|--------|-----|-----|-----|-----|-----|
| 5. .02 | .15 | .09 | .24 | .18 | .04 |
| 6. .35 | .46 | .27 | .03 | .53 | .68 |

Read the following decimal mixed numbers. Remember that the decimal point is read "and."

7. 4.8 12.48 9.7 3.07 15.68 10.3
8. 25.4 124.1 59.78 46.39 148.05 99.9

► If the number of hundredths is less than 10, a zero must be written to the right of the decimal point to make the fraction mean hundredths.

Write the fractions below as decimals. Remember that there is one place at the right of the decimal point for tenths, and two places for hundredths.

9. $\frac{3}{10}$ $\frac{8}{100}$ $\frac{6}{100}$ $\frac{12}{100}$ $\frac{5}{10}$ $\frac{16}{100}$ $\frac{3}{100}$ $\frac{8}{10}$
10. $\frac{62}{100}$ $\frac{7}{100}$ $\frac{2}{10}$ $\frac{1}{100}$ $\frac{87}{100}$ $\frac{37}{100}$ $\frac{1}{10}$ $\frac{9}{100}$

Write the numbers below as decimals or decimal mixed numbers. Then read them.

- | A | B |
|--------------------------------|----------------------|
| 11. One-tenth | 85 hundredths |
| 12. One and five-hundredths | 7 tenths |
| 13. Twenty-seven hundredths | 7 hundredths |
| 14. Two and twelve-hundredths | 12 and 75 hundredths |
| 15. Eight and two-tenths | 5 and 8 tenths |
| 16. Twenty-five and six-tenths | 50 and 1 tenth |
| 17. One hundredth | 50 and 1 hundredth |

KEEPING ON YOUR TOES

The sentences below are not sensible, because the decimal points have been left out. Copy the numbers and place the decimal points correctly.

1. Bob weighs 815 pounds.
2. In January the snow was 35 feet deep.
3. The temperature yesterday was 487 degrees.
4. Helen bought a book for \$250.

Money and Decimals

Any amount of money less than one dollar is a fractional part of a dollar and may be expressed as a decimal. You have been using decimals of this kind for a long time.

1. There are 100 cents in a dollar. One cent is $\frac{1}{100}$ of a dollar.

Then 5 cents is $\frac{5}{100}$ of a dollar and is written \$.05.

Write as decimals: 8 cents; 3 cents; 1 cent.

2. A dime is $\frac{10}{100}$ of a dollar. We write it \$.10. A dime is also $\frac{1}{10}$ of a dollar; $\frac{10}{100}$ reduced to lowest terms = $\frac{1}{10}$.

Three dimes are how many hundredths of a dollar? seven dimes?

Eighty cents are how many hundredths of a dollar? forty cents?

3. Fifteen cents may be written \$.15. It means $\frac{15}{100}$ of a dollar. It also means 1 dime and 5 cents. The dime is $\frac{10}{100}$, or $\frac{1}{10}$, of a dollar, and the 5 cents are 5 hundredths of a dollar.

The 1 is written in tenths' place, and the 5 is written in hundredths' place.

How many dimes and how many extra cents are there in \$.28? This number means 28 hundredths of a dollar.

\$.75 means ? hundredths of a dollar.

4. Tell how many whole dollars and how many hundredths of a dollar each of these amounts contains: \$4.35; \$6.78; \$2.06; \$10.10.

5. How should 5 dollars and 40 cents be written in decimal form? This number contains how many whole dollars? how many hundredths of a dollar?

6. Write as decimals: 9 cents; 5 dimes; $\frac{98}{100}$ dollar; 1 nickel; 1 quarter; 8 dollars and 35 cents.

Our Number System

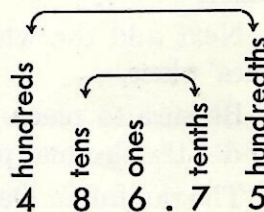
In the number 486.75, there is a decimal point which separates the whole number 486 from the decimal fraction .75. The whole number is written to the left of the decimal point. The decimal fraction is written to the right of the decimal point.

The whole number 486 means $400 + 80 + 6$. The 6 is written in ones' place, the 8 in tens' place, and the 4 in hundreds' place.

The first figure at the right of the decimal point stands for *tenths*. The second figure at the right of the decimal point stands for *hundredths*. Then we have 7 tenths and 5 hundredths, or 75 hundredths.

So we read the number 486.75 this way: "four hundred eighty-six and seventy-five hundredths."

The number as it is written here will help you make sure of the names of the places at the left and at the right of the decimal point.



► The first figure at the left of ones' place means *tens*. The first figure at the right of ones' place means *tenths*.

► The second figure at the left of ones' place means *hundreds*. The second figure at the right of ones' place means *hundredths*.

1. Tell what each figure means in the following numbers:

849.67

293.44

333.33

2. Write the following numbers in words:

A. 5.15

B. 29.4

C. 600.04

D. 109.75

E. 79.08

Adding Tenths

In one year, the rainfall in Denver during the month of April was 2.1 inches; during May the rainfall was 2.2 inches. How many inches of rain fell in the two months?

Example A shows how these numbers are added when common fractions are used. Example B shows how the numbers are added when decimal fractions are used.

A	B
$\begin{array}{r} 2\frac{1}{10} \\ 2\frac{2}{10} \\ \hline 4\frac{3}{10} \end{array}$	$\begin{array}{r} 2.1 \\ 2.2 \\ \hline 4.3 \end{array}$

In writing decimals to be added, always keep the decimal points in a straight column. Write tenths under tenths, and ones under ones.

Now add the decimals just as whole numbers are added. First add the tenths: $.1 + .2 = .3$. Write 3 in tenths' place.

Next add the whole numbers: $2 + 2 = 4$. Write 4 in ones' place.

Be sure to place the decimal point in the sum directly under the decimal points in the numbers you are adding.

The rainfall in Denver for the two months was 4.3 inches.

1. In one year, in New Orleans, the rainfall during February was 4.2 inches. In March the rainfall was 4.7 inches. Find the total amount of rainfall in New Orleans for these two months. First use fractions. Then use decimals.

2. One January the rainfall in Dallas, Texas, was 2.4 inches. In February the rainfall was 2.3 inches. Find the total amount of rainfall for the two months, using fractions and then decimals.

3. Find the sums:

A. $6.3 + 2.5$

C. $8.1 + 4.7$

E. $7.2 + 3.4$

B. $9.5 + 6.4$

D. $7.3 + 9.2$

F. $2.8 + 8.1$

Carrying When We Add Decimals

One Saturday Ted rode his bicycle 2.7 miles in the morning and 3.6 miles in the afternoon. How many miles did he ride that day?



Example A shows how these numbers are added when common fractions are used. Example B shows how the numbers are added when decimal fractions are used.

A	B
$\begin{array}{r} 2\frac{7}{10} \\ 3\frac{6}{10} \\ \hline 5\frac{13}{10} = 6\frac{3}{10} \end{array}$	$\begin{array}{r} 2.7 \\ 3.6 \\ \hline 6.3 \end{array}$

Add .7 and .6. The sum is 13 tenths. Since there are 10 tenths in one whole, write .3 in the sum and carry 1 to the ones' column. Add: $1 + 2 + 3 = 6$.

Ted rode 6.3 miles.

1. Study the examples below. Then copy them without the sums. Close your book and add.

$\begin{array}{r} .7 \\ .3 \\ \hline 1.5 \end{array}$	$\begin{array}{r} 8.9 \\ 4.2 \\ \hline 16.1 \end{array}$	$\begin{array}{r} 5.3 \\ .7 \\ \hline 6.2 \end{array}$	$\begin{array}{r} 9.6 \\ 4.4 \\ \hline 19.0 \end{array}$
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When you understand the examples above, copy the examples below. Add, and check your work.

	A	B	C	D	E	F	G	H
2.	$\begin{array}{r} .5 \\ .7 \\ .7 \\ \hline \end{array}$	$\begin{array}{r} .8 \\ .4 \\ .9 \\ \hline \end{array}$	$\begin{array}{r} .9 \\ .6 \\ .8 \\ \hline \end{array}$	$\begin{array}{r} .8 \\ .9 \\ .8 \\ \hline \end{array}$	$\begin{array}{r} 9.5 \\ 3.6 \\ 4.0 \\ \hline \end{array}$	$\begin{array}{r} 8.9 \\ 3.0 \\ 6.8 \\ \hline \end{array}$	$\begin{array}{r} 6.7 \\ 5.8 \\ 2.4 \\ \hline \end{array}$	$\begin{array}{r} 4.5 \\ 1.9 \\ 2.0 \\ \hline \end{array}$
3.	$\begin{array}{r} 4.8 \\ 7.8 \\ 5.4 \\ \hline \end{array}$	$\begin{array}{r} 7.6 \\ .9 \\ .2 \\ \hline \end{array}$	$\begin{array}{r} .2 \\ .8 \\ 4.0 \\ \hline \end{array}$	$\begin{array}{r} 9.4 \\ .6 \\ 6.0 \\ \hline \end{array}$	$\begin{array}{r} 3.8 \\ 8.6 \\ 2.6 \\ \hline \end{array}$	$\begin{array}{r} 9.9 \\ 7.7 \\ .8 \\ \hline \end{array}$	$\begin{array}{r} 5.6 \\ .5 \\ .9 \\ \hline \end{array}$	$\begin{array}{r} 3.7 \\ 5.5 \\ .5 \\ \hline \end{array}$

Subtracting Tenths

One loaded freight car weighs 52.7 tons. Another loaded freight car weighs 50.6 tons. What is the difference in weight of the two cars?

Example A shows how to subtract with common fractions.

A	B
$52\frac{7}{10}$	52.7
$50\frac{6}{10}$	50.6
<u>2</u> $\frac{1}{10}$	<u>2.1</u>

Example B uses decimal fractions.

First subtract the tenths: $.7 - .6 = .1$. Write .1 in tenths place in the remainder. Subtract the whole number as you always do. Place the decimal point under the decimal points in the numbers above.

One loaded freight car weighs 2.1 tons more than the other.

1. Study the examples below. Then copy them without the remainders and subtract.

$\begin{array}{r} .6 \\ .3 \\ \hline .3 \end{array}$	$\begin{array}{r} 4.7 \\ 2.1 \\ \hline 2.6 \end{array}$	$\begin{array}{r} 6.9 \\ .4 \\ \hline 6.5 \end{array}$	$\begin{array}{r} 8.3 \\ 2.3 \\ \hline 6.0 \end{array}$	$\begin{array}{r} 37.6 \\ 4.6 \\ \hline 33.0 \end{array}$
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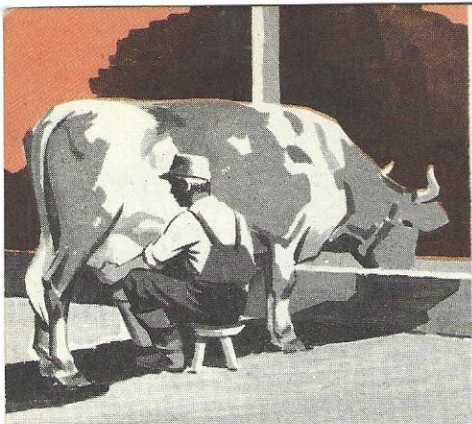
When you understand the examples above, copy the following examples and subtract. Check by adding.

	A	B	C	D	E	F
2.	$\begin{array}{r} .8 \\ .1 \\ \hline .7 \end{array}$	$\begin{array}{r} .9 \\ .5 \\ \hline .4 \end{array}$	$\begin{array}{r} .7 \\ .2 \\ \hline .5 \end{array}$	$\begin{array}{r} 8.5 \\ 3.2 \\ \hline 5.3 \end{array}$	$\begin{array}{r} 9.8 \\ 1.5 \\ \hline 8.3 \end{array}$	$\begin{array}{r} 7.9 \\ 1.2 \\ \hline 6.7 \end{array}$
3.	$\begin{array}{r} 8.8 \\ .6 \\ \hline 8.2 \end{array}$	$\begin{array}{r} 12.9 \\ 6.7 \\ \hline 6.2 \end{array}$	$\begin{array}{r} 18.9 \\ 9.0 \\ \hline 9.9 \end{array}$	$\begin{array}{r} 6.6 \\ 4.6 \\ \hline 2.0 \end{array}$	$\begin{array}{r} 8.4 \\ 2.4 \\ \hline 6.0 \end{array}$	$\begin{array}{r} 16.5 \\ 2.5 \\ \hline 14.0 \end{array}$
4.	$\begin{array}{r} 17.5 \\ 8.3 \\ \hline 9.2 \end{array}$	$\begin{array}{r} 47.3 \\ 3.3 \\ \hline 44.0 \end{array}$	$\begin{array}{r} 36.8 \\ 18.4 \\ \hline 18.4 \end{array}$	$\begin{array}{r} 52.6 \\ 17.1 \\ \hline 35.5 \end{array}$	$\begin{array}{r} 74.7 \\ 38.5 \\ \hline 36.2 \end{array}$	$\begin{array}{r} 62.9 \\ 49.6 \\ \hline 13.3 \end{array}$



The Circus

1. One spring a circus traveled 1,297 miles from Sarasota, Florida, to New York, where it gave its first performance of the year. It then traveled 313 miles to Boston, and from there to Washington, D. C., a distance of 578 miles. How many miles did the circus travel to reach the first three towns on its tour?
2. Mr. Johnson took 15 members of a boys' club to a matinee performance. The boys' tickets cost \$11.25 altogether. How much did one boy's ticket cost?
3. Dick earned \$2.10. At the circus he spent \$.10 for peanuts, \$.15 for a sandwich, and \$.95 for a souvenir. How much did he have left?
4. In one of the animal acts, Dick counted 14 elephants. He learned later that young elephants cost about \$3000 each. At this price, what was the cost of the 14 elephants?
5. Elephants are very fond of stale bread. If a circus with 44 elephants bought 110 loaves of day-old bread from a bakery, how many loaves would there be for each elephant?
6. A circus bought 9 lions for \$3375. What was the average price of the lions?
7. One year a circus gave 415 performances. It gave 106 performances indoors in large cities. The others were given under the "Big Top." How many shows were given in the huge tent?



Adding Hundredths

Mr. Clark owns one cow that gives an average of 16.25 pounds of milk daily and another that gives an average of 14.47 pounds. What is the average amount of milk given by the two cows per day?

Study the work at the right. Tenths are written under tenths, hundredths are written under hundredths, and the decimal points are also in a straight column.

$$\begin{array}{r} 16.25 \\ 14.47 \\ \hline 30.72 \end{array}$$

Add the hundredths; write 2 and carry 1. Add the tenths; write 7. Now add the whole numbers.

On the average, the amount of milk given by the two cows is 30.72 pounds per day.

Copy and add. Check your work.

	A	B	C	D	E	F
1.	$\begin{array}{r} .07 \\ .09 \\ \hline \end{array}$	$\begin{array}{r} .06 \\ .08 \\ \hline \end{array}$	$\begin{array}{r} .25 \\ .46 \\ \hline \end{array}$	$\begin{array}{r} .59 \\ .38 \\ \hline \end{array}$	$\begin{array}{r} .67 \\ .75 \\ \hline \end{array}$	$\begin{array}{r} .85 \\ .39 \\ \hline \end{array}$
2.	$\begin{array}{r} 4.06 \\ 7.96 \\ \hline \end{array}$	$\begin{array}{r} 3.73 \\ 6.68 \\ \hline \end{array}$	$\begin{array}{r} 9.05 \\ 6.05 \\ \hline \end{array}$	$\begin{array}{r} 25.78 \\ 7.47 \\ \hline \end{array}$	$\begin{array}{r} 14.36 \\ 68.95 \\ \hline \end{array}$	$\begin{array}{r} 76.24 \\ 16.78 \\ \hline \end{array}$
3.	$\begin{array}{r} .04 \\ .07 \\ .06 \\ \hline \end{array}$	$\begin{array}{r} .09 \\ .05 \\ .07 \\ \hline \end{array}$	$\begin{array}{r} .66 \\ .24 \\ .44 \\ \hline \end{array}$	$\begin{array}{r} 6.09 \\ 2.17 \\ 3.04 \\ \hline \end{array}$	$\begin{array}{r} 8.36 \\ .49 \\ .27 \\ \hline \end{array}$	$\begin{array}{r} .72 \\ .58 \\ 5.09 \\ \hline \end{array}$
4.	$\begin{array}{r} 17.58 \\ 23.48 \\ 6.37 \\ \hline \end{array}$	$\begin{array}{r} 24.07 \\ 25.03 \\ 19.05 \\ \hline \end{array}$	$\begin{array}{r} 32.48 \\ 9.09 \\ 7.14 \\ \hline \end{array}$	$\begin{array}{r} 34.77 \\ .08 \\ 3.45 \\ \hline \end{array}$	$\begin{array}{r} .09 \\ .86 \\ 48.03 \\ \hline \end{array}$	$\begin{array}{r} 53.08 \\ 89.62 \\ 3.26 \\ \hline \end{array}$

Subtracting Hundredths

One year the rainfall in Oklahoma was 31.67 inches. That year the rainfall in New Mexico was 8.06 inches. How much greater was the rainfall in Oklahoma than in New Mexico?

$$\begin{array}{r} 31.67 \\ - 8.06 \\ \hline 23.61 \end{array}$$

To find the answer, you subtract 8.06 inches from 31.67 inches.

You subtract decimals just as you subtract whole numbers. Place hundredths under hundredths and tenths under tenths. Keep the decimal points in a straight column.

1. In one year, the rainfall in Arizona was 12.88 inches. In Nevada it was 8.48 inches. How much greater was the rainfall in Arizona?
2. That year, the rainfall in Oregon was 20.77 inches, and in South Dakota it was 15.71 inches. How much less was the rainfall in South Dakota than in Oregon?

Copy and subtract. Check your work.

	A	B	C	D	E	F
3.	$\begin{array}{r} .94 \\ - .32 \\ \hline \end{array}$	$\begin{array}{r} .75 \\ - .14 \\ \hline \end{array}$	$\begin{array}{r} 2.87 \\ - .25 \\ \hline \end{array}$	$\begin{array}{r} 5.09 \\ - 2.04 \\ \hline \end{array}$	$\begin{array}{r} 8.17 \\ - 1.06 \\ \hline \end{array}$	$\begin{array}{r} 7.98 \\ - .23 \\ \hline \end{array}$
4.	$\begin{array}{r} 12.18 \\ - 3.18 \\ \hline \end{array}$	$\begin{array}{r} 10.67 \\ - 4.43 \\ \hline \end{array}$	$\begin{array}{r} 24.85 \\ - 18.53 \\ \hline \end{array}$	$\begin{array}{r} 82.89 \\ - 25.76 \\ \hline \end{array}$	$\begin{array}{r} 94.39 \\ - 47.01 \\ \hline \end{array}$	$\begin{array}{r} 44.69 \\ - 25.15 \\ \hline \end{array}$

5. Subtract four and thirty-two hundredths from seven and sixty-six hundredths.
6. Write the place value of each figure in this decimal mixed number: 25.03.

Practicing What You Have Learned

Copy and add. Be sure to keep the figures and the decimal points in straight columns.

	A	B	C	D	E	F
1.	<u>5.3</u> <u>2.6</u>	<u>9.4</u> <u>3.3</u>	<u>8.7</u> <u>4.3</u>	<u>7.8</u> <u>3.4</u>	<u>.9</u> <u>3.6</u>	<u>4.7</u> <u>6.7</u>
2.	<u>.3</u> <u>.8</u> <u>.7</u>	<u>5.3</u> <u>6.5</u> <u>3.6</u>	<u>6.4</u> <u>.8</u> <u>.1</u>	<u>4.5</u> <u>7.9</u> <u>5.4</u>	<u>9.4</u> <u>3.6</u> <u>5.0</u>	<u>3.9</u> <u>3.8</u> <u>5.3</u>
3.	<u>.05</u> <u>.04</u> <u>.07</u>	<u>.27</u> <u>.75</u> <u>.42</u>	<u>.46</u> <u>.80</u> <u>.39</u>	<u>8.07</u> <u>8.18</u> <u>2.06</u>	<u>.82</u> <u>.54</u> <u>6.08</u>	<u>3.58</u> <u>7.32</u> <u>.27</u>
4.	<u>3.15</u> <u>2.75</u> <u>4.95</u>	<u>5.73</u> <u>7.70</u> <u>6.49</u>	<u>9.20</u> <u>8.07</u> <u>7.49</u>	<u>.96</u> <u>.65</u> <u>6.04</u>	<u>8.04</u> <u>.59</u> <u>.67</u>	<u>2.87</u> <u>8.04</u> <u>.05</u>

Copy and subtract:

5.	<u>.7</u> <u>.4</u>	<u>5.9</u> <u>2.6</u>	<u>6.8</u> <u>1.2</u>	<u>9.7</u> <u>8.7</u>	<u>9.9</u> <u>2.5</u>	<u>12.7</u> <u>6.1</u>
6.	<u>15.7</u> <u>9.2</u>	<u>17.5</u> <u>8.5</u>	<u>21.9</u> <u>9.0</u>	<u>145.8</u> <u>87.3</u>	<u>350.3</u> <u>29.1</u>	<u>124.6</u> <u>56.5</u>
7.	<u>.85</u> <u>.40</u>	<u>6.74</u> <u>4.33</u>	<u>9.54</u> <u>7.34</u>	<u>15.89</u> <u>8.51</u>	<u>9.83</u> <u>4.60</u>	<u>17.98</u> <u>9.41</u>
8.	<u>24.65</u> <u>.04</u>	<u>86.68</u> <u>3.68</u>	<u>78.46</u> <u>57.12</u>	<u>80.19</u> <u>18.13</u>	<u>30.53</u> <u>7.12</u>	<u>14.28</u> <u>8.15</u>

Practice in Solving Problems

Read each problem carefully. Think what the problem tells you and what you are to find. Decide how to find the answer and then finish solving the problem.

1. Charles has a garden $10\frac{3}{4}$ feet wide and $15\frac{1}{2}$ feet long. What is the perimeter of his garden?
2. Mrs. Webb baked $2\frac{2}{3}$ dozen date cookies and $3\frac{1}{3}$ dozen oatmeal cookies. How many dozen cookies did she bake?
3. John ran the 50-yard dash in $10\frac{1}{2}$ seconds. Ralph ran it in $9\frac{3}{10}$ seconds. Ralph's time was how much less than John's?
4. The normal temperature of our bodies is 98.6° . One day when Dan was ill, his temperature was 101.6° . This was how many degrees above normal?
5. Amy weighs 75 pounds, Helen 78 pounds, Joan 72 pounds, and Mary 70 pounds. What is the average weight of the four girls? Write the remainder in the answer as a fraction.
6. A dozen new pencil sharpeners were bought for school use. Each one cost \$4.75. What was the total cost?
7. Six boys spent \$2.70 to buy the food for a picnic. If the boys shared the cost equally, how much did each boy pay?



Adding and Subtracting Dollars and Cents

When you add and subtract dollars and cents, you are adding and subtracting decimals.

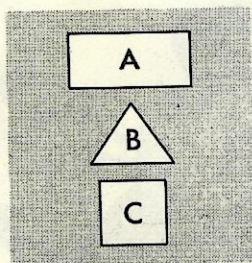
Copy and add:

	A	B	C	D	E
1.	\$\$.07	\$.65	\$.98	\$1.26	\$4.50
	.15	.18	.69	9.40	5.75
	.03	.09	.45	.48	.25
	.06	.10	.78	.56	.16
	.04	.03	.08	6.75	.15
	.02	.84	.06		6.48
2.	\$75.38	\$38.42	\$64.75	\$27.58	\$638.16
	40.60	47.69	7.23	3.80	223.69
	3.15	3.73	.86	5.77	18.04
	6.44	6.25	9.00	1.89	34.85
	18.06	24.03	2.08	.69	

Copy and subtract:

3.	\$12.50	\$50.25	\$90.00	\$417.04	\$542.15
	9.25	17.68	38.43	48.65	123.66
4.	\$305.30	\$200.45	\$500.00	\$619.45	\$738.60
	96.78	153.49	12.57	324.57	600.29

KEEPING ON YOUR TOES



1. Which figure has four equal sides — a rectangle, a square, or a triangle?
2. Which one is a three-sided figure?
3. What is the perimeter of a figure?
4. How do you find the perimeter of a square? a triangle?

Making Sure of Decimals

If you find that you need more practice in adding and subtracting decimals, turn to the pages listed.

1. Add, and check your work:

A	B	C	D	E	
.7	3.8	9.0	7.5	6.3	329
.5	9.2	6.5	9.3	8.0	
<u>.4</u>	<u>7.3</u>	<u>3.8</u>	<u>5.7</u>	<u>1.9</u>	

2. Subtract, and check your work:

9.7	18.9	14.8	12.1	135.6	330
<u>3.4</u>	<u>9.5</u>	<u>7.2</u>	<u>9.0</u>	<u>49.4</u>	

3. Add, and check:

.08	.85	6.04	4.56	5.00	332
.04	.66	8.07	5.04	.89	
<u>.06</u>	<u>.54</u>	<u>6.01</u>	<u>.67</u>	<u>.23</u>	

4. Subtract, and check:

.86	.39	6.14	8.65	15.97	333
<u>.12</u>	<u>.14</u>	<u>.12</u>	<u>3.32</u>	<u>8.25</u>	

KEEPING ON YOUR TOES

1. Why is a decimal point needed in a decimal mixed number?
2. Write the following numbers with common fractions and then as decimals: one-tenth; three and nine-tenths; seven-hundredths; five and eleven-hundredths.
3. Write the following as mixed numbers, and add them: three and one-tenth; five and three-tenths. Now, write them as decimal mixed numbers and add them.

Using Decimals in Problems

1. A gallon of milk weighs 8.60 pounds and a gallon of cream weighs 8.37 pounds. How much do they weigh altogether?
2. There are two ways to drive from Centerville to Paxton. By one route it is 35.6 miles. By the other, it is 39.8 miles. If you go one way and return the other, how many miles do you drive?
3. What is the difference in mileage between the two routes in Problem 2?
4. The average yearly amount of rainfall in Phoenix, Arizona, is 7.6 inches. The average amount in New Orleans is 59.7 inches. What is the difference between the average amounts of rainfall in the two cities?
5. At present the average speed of freight trains is 16.9 miles per hour. In 1921 the average speed of freight trains was 11.5 miles per hour. By how many miles has the average speed been increased?
6. One year the total rainfall in New York City was 49.56 inches. Another year the rainfall was 45.03 inches. What was the difference in the amount of rainfall?
7. Mr. Carter uses his car in his business. One day he drove 24.5 miles, the next day 19.6 miles, and the third day 27.3 miles. How many miles did he drive in the 3 days?
8. By train it is 252.2 miles from St. Louis to Indianapolis, and 535.6 miles from St. Louis to Cleveland. What is the distance in miles from Indianapolis to Cleveland?



Keeping in Practice

Set I

Copy and add:

- | | |
|---|---|
| <p>1. $\begin{array}{r} 56,870 \\ 29,079 \\ 6,833 \\ \hline 476 \end{array}$</p> | <p>2. $\begin{array}{r} 4685 \\ 2903 \\ 5761 \\ \hline 9027 \end{array}$</p> |
|---|---|

Copy and subtract:

- | | |
|--|---|
| <p>3. $\begin{array}{r} 47,204 \\ \hline 3,809 \end{array}$</p> | <p>4. $\begin{array}{r} 730,645 \\ \hline 584,078 \end{array}$</p> |
|--|---|

Copy and multiply:

- | | | | | |
|---|---|---|---|---|
| <p>5. $\begin{array}{r} 4308 \\ \hline 80 \end{array}$</p> | <p>6. $\begin{array}{r} 6853 \\ \hline 74 \end{array}$</p> | <p>7. $\begin{array}{r} 790 \\ \hline 906 \end{array}$</p> | <p>8. $\begin{array}{r} 468 \\ \hline 539 \end{array}$</p> | <p>9. $\begin{array}{r} 279 \\ \hline 548 \end{array}$</p> |
|---|---|---|---|---|

Set II

Copy, divide, and check:

- | A | B | C | D |
|---------------------------|------------------------|------------------------|------------------------|
| 1. $16 \overline{)610}$ | $14 \overline{)1203}$ | $17 \overline{)1540}$ | $19 \overline{)1359}$ |
| 2. $28 \overline{)400}$ | $56 \overline{)3500}$ | $48 \overline{)2424}$ | $37 \overline{)3333}$ |
| 3. $68 \overline{)4800}$ | $77 \overline{)2800}$ | $85 \overline{)7000}$ | $96 \overline{)3791}$ |
| 4. $79 \overline{)3761}$ | $93 \overline{)8402}$ | $39 \overline{)3250}$ | $47 \overline{)2332}$ |
| 5. $12 \overline{)5028}$ | $18 \overline{)7344}$ | $15 \overline{)3744}$ | $19 \overline{)3618}$ |
| 6. $83 \overline{)28291}$ | $98 \overline{)23533}$ | $89 \overline{)64999}$ | $99 \overline{)25755}$ |

Set III

1. Reduce to lowest terms: $\frac{8}{12}$, $\frac{6}{10}$, $\frac{2}{8}$.
2. Change to whole or mixed numbers: $\frac{10}{5}$, $\frac{18}{6}$, $\frac{12}{8}$.
3. A. $7\frac{5}{4} = ?$ B. $9\frac{9}{6} = ?$ C. $4\frac{3}{3} = ?$ D. $6\frac{10}{8} = ?$
4. Find the sum of $6\frac{3}{8}$ and $9\frac{5}{8}$.
5. $9\frac{7}{12} - 3\frac{1}{12} = ?$
6. $5\frac{5}{12} + 6\frac{1}{4} = ?$

QUICK REVIEW TESTS

Whole Numbers

I. **Addition.** Pages 289-292 give more practice.

A	B	C	D	E
8	60	3247	60,040	279
6	75	1549	28,754	235
7	18	6028	2,347	546
3	36	7150	<u>650</u>	82
3	42	<u>2851</u>		126
8	<u>90</u>			<u>98</u>
<u>5</u>				

II. **Subtraction.** Pages 293 and 294 give more practice.

1.	433 <u>389</u>	2645 <u>58</u>	4912 <u>573</u>	5350 <u>956</u>	6261 <u>4267</u>
2.	58,142 <u>8,306</u>	80,412 <u>71,495</u>	93,570 <u>7,232</u>	15,076 <u>379</u>	88,000 <u>42,264</u>
3.	425,461 <u>87,895</u>	820,400 <u>8,648</u>	900,324 <u>257,466</u>	823,167 <u>397,489</u>	416,194 <u>57,398</u>

III. **Multiplication.** Pages 297-300 give more practice.

1.	46,039 <u>6</u>	83,904 <u>4</u>	75 <u>84</u>	48 <u>97</u>	98 <u>75</u>
2.	587 <u>39</u>	906 <u>28</u>	705 <u>60</u>	900 <u>900</u>	3048 <u>80</u>
3.	\$50.67 <u>57</u>	\$3.48 <u>635</u>	\$6.20 <u>490</u>	\$7.30 <u>570</u>	\$4.68 <u>480</u>

IV. **Division.** Pages 302-306 give more practice.

A	B	C	D	E
1. $8\overline{)6348}$	$7\overline{)3950}$	$9\overline{)5427}$	$5\overline{)4753}$	$6\overline{)4800}$
2. $85\overline{)3358}$	$72\overline{)5000}$	$83\overline{)5100}$	$92\overline{)5191}$	$74\overline{)2700}$
3. $72\overline{)5793}$	$91\overline{)6400}$	$51\overline{)1580}$	$94\overline{)3770}$	$63\overline{)3780}$
4. $37\overline{)650}$	$47\overline{)736}$	$39\overline{)630}$	$69\overline{)3500}$	$77\overline{)5384}$
5. $27\overline{)2278}$	$58\overline{)1650}$	$36\overline{)2365}$	$77\overline{)2260}$	$29\overline{)2407}$
6. $93\overline{)57500}$	$16\overline{)1736}$	$71\overline{)57742}$	$74\overline{)22253}$	$57\overline{)19388}$

Understanding Fractions

If you need help, turn to the pages listed at the right.

1. Give the numerator and the denominator of each of these fractions: $\frac{2}{3}$, $\frac{4}{5}$, $\frac{3}{10}$, $\frac{1}{12}$. 178
2. Tell what each fraction above means. 178
3. Reduce to lowest terms: $\frac{10}{12}$, $\frac{5}{16}$, $\frac{4}{10}$, $\frac{6}{8}$, $\frac{3}{5}$, $\frac{1}{10}$. 187
4. 3 is what part of 12? of 9? 189
5. Change each of these to a mixed number:
 $\frac{17}{8}$, $\frac{14}{3}$, $\frac{42}{5}$, $\frac{12}{5}$, $\frac{9}{4}$, $\frac{2}{4}$, $\frac{8}{6}$, $1\frac{1}{3}$ 195
6. Write two proper fractions. $\frac{3}{5}$, $\frac{2}{3}$ 195
7. Write two improper fractions. $\frac{5}{4}$, $\frac{10}{8}$ 195
8. Change each of these to a whole number:
 $\frac{4}{4}$, $\frac{6}{6}$, $1\frac{10}{5}$, $2\frac{8}{2}$, $4\frac{12}{4}$, 3 199
9. A. $\frac{3}{4}$ of 36 = ? B. $\frac{2}{3}$ of 27 = ? 246, 247
10. Change $\frac{3}{4}$ to eighths; $\frac{2}{3}$ to sixths. $\frac{6}{8}$, $\frac{4}{6}$ 263
11. What denominator should you use when adding one-half and three-fourths? one-fourth and five-eighths? one-half and three-eighths? 264

Adding and Subtracting Fractions

Add:

	A	B	C	D	E	F	
1.	$\frac{1}{5}$ $\frac{3}{5}$	$5\frac{1}{16}$ $6\frac{3}{16}$	$8\frac{5}{12}$ $7\frac{7}{12}$	$7\frac{9}{10}$ $6\frac{3}{10}$	$9\frac{3}{5}$ $8\frac{2}{5}$	$6\frac{5}{8}$ $4\frac{7}{8}$	202 204
2.	$6\frac{1}{10}$ $9\frac{1}{5}$	$5\frac{1}{4}$ $4\frac{1}{2}$	$2\frac{3}{4}$ $8\frac{3}{8}$	$7\frac{5}{6}$ $7\frac{2}{3}$	$3\frac{4}{5}$ $9\frac{3}{10}$	$8\frac{2}{3}$ $5\frac{7}{12}$	273 274

Subtract:

3.	$7\frac{4}{5}$ $3\frac{2}{5}$	$14\frac{3}{8}$ $8\frac{1}{8}$	$12\frac{7}{12}$ $5\frac{1}{12}$	$17\frac{9}{10}$ $9\frac{3}{10}$	$16\frac{3}{4}$ 7	$22\frac{5}{8}$ $19\frac{5}{8}$	211
4.	$9\frac{1}{4}$ $5\frac{1}{8}$	$8\frac{5}{24}$ $6\frac{1}{8}$	$15\frac{1}{2}$ $9\frac{1}{10}$	$12\frac{1}{3}$ $4\frac{1}{2}$	$10\frac{5}{6}$ $7\frac{2}{3}$	$13\frac{7}{10}$ $6\frac{1}{5}$	280

Measures

- | | | |
|---|-------------------|-----|
| 1. A. 3 ft. 9 in. = ? in. | B. 12 yd. = ? ft. | 221 |
| 2. A. 2 mi. = ? ft. | B. 2 mi. = ? yd. | 220 |
| 3. A. $2\frac{1}{4}$ gal. = ? qt. | B. 20 pt. = ? qt. | 226 |
| 4. It is ? min. from 1:15 to 1:50 P.M. | | 229 |
| 5. When it is 6 P.M. in New York, what time is it in San Francisco? | | 232 |
| 6. A. 28 oz. = ? lb. and ? oz. | B. 3 lb. = ? oz. | 238 |
| 7. A. 3 bu. = ? pk. | B. 2 pk. = ? qt. | 242 |

Decimals

- | | | |
|--------------------------|-----------------------------|-----|
| 1. $.4 + .2 + .3 = ?$ | 5. $.03 + .25 + .88 = ?$ | 328 |
| 2. $.8 + .6 + .4 = ?$ | 6. $4.07 + 8.67 + 4.53 = ?$ | 329 |
| 3. $3.7 + 5.3 + 3.5 = ?$ | 7. $15.79 - 6.47 = ?$ | 329 |
| 4. $17.8 - 9.2 = ?$ | 8. $32.85 - 18.32 = ?$ | 330 |

The Camping Trip

1. Mr. Carter and Mr. Burke took a group of boys on a camping trip. Mr. Carter drove his truck to camp at an average speed of 31.8 miles per hour, and Mr. Burke drove his at an average of 20.6 miles per hour. What was the difference in the average speeds?
2. In planning the trip, they found they needed new rope for one of the tents. Two pieces 8 feet long were needed for the ends. Eight pieces, each 6 feet long, were needed for the sides. How much rope had to be bought?
3. They also bought 18 tent stakes. At \$1.80 a dozen, how much did 18 cost?
4. On the side road that led to the camp there was a sign on a small bridge: "Safe Limit — 3500 lb." Mr. Carter said his truck with a full load weighed about $1\frac{1}{2}$ tons. This was about how many pounds less than the safe limit of the bridge?
5. Tom's father had promised Tom a sleeping bag if Tom saved $\frac{1}{4}$ of the cost. The sleeping bag cost \$16.80. How much did Tom have to save? How much did his father have to pay?
6. Jack had spent \$1.25 for a jackknife, \$.89 for a compass, and \$2.50 for a book about camping. How much did he spend in all?
7. At a farm nearby, Mr. Burke bought 6 quarts of milk at 19 cents a quart and 2 dozen eggs at 58 cents a dozen. How much did he spend in all?
8. On the five days in camp, the thermometer readings at 9 A.M. were 68°, 73°, 67°, 70°, and 72°. What was the average temperature at 9 A.M. for the 5 days?

Tables of Measures

MEASURES OF LENGTH

12 inches (in.)	= 1 foot (ft.)
36 inches	= 1 yard (yd.)
3 feet	= 1 yard
$16\frac{1}{2}$ feet	= 1 rod (rd.)
$5\frac{1}{2}$ yards	= 1 rod
320 rods	= 1 mile (mi.)
5280 feet	= 1 mile
1760 yards	= 1 mile

MEASURES OF COUNTING

2 things	= 1 pair (pr.)
12 things	= 1 dozen (doz.)

MEASURES OF WEIGHT

16 ounces (oz.)	= 1 pound (lb.)
2000 pounds	= 1 ton (T.)

LIQUID MEASURES

2 cups	= 1 pint (pt.)
2 pints	= 1 quart (qt.)
4 quarts	= 1 gallon (gal.)

DRY MEASURES

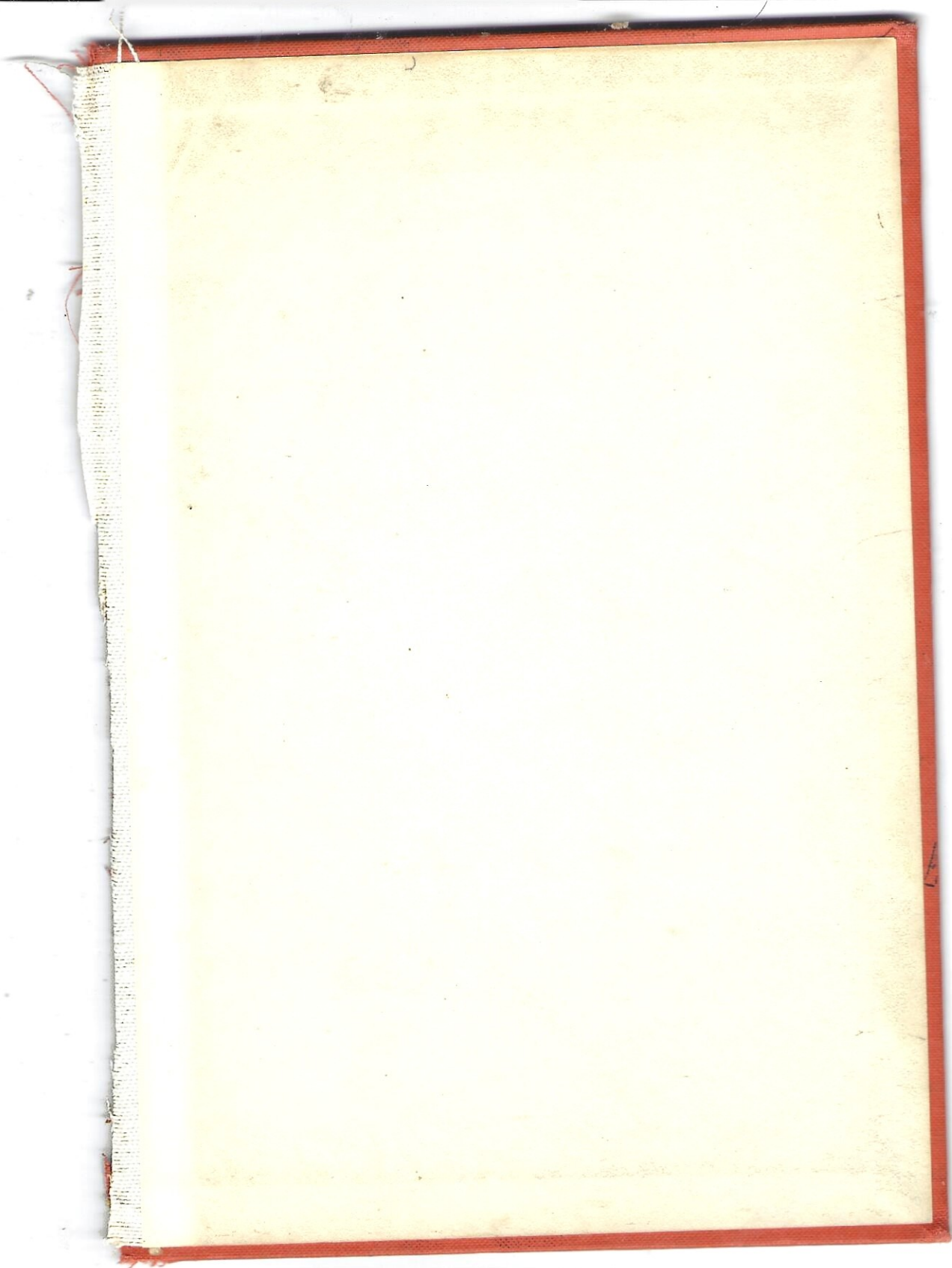
2 pints (pt.)	= 1 quart (qt.)
8 quarts	= 1 peck (pk.)
4 pecks	= 1 bushel (bu.)

MEASURES OF TIME

60 seconds (sec.)	= 1 minute (min.)	52 weeks	= 1 year (yr.)
60 minutes	= 1 hour (hr.)	12 months	= 1 year
24 hours	= 1 day (da.)	365 days	= 1 year
7 days	= 1 week (wk.)	366 days	= 1 leap year
100 years = 1 century			

UNITED STATES MONEY

5 cents	= 1 nickel	25 cents	= 1 quarter
2 nickels	= 1 dime	4 quarters	= 1 dollar
10 cents	= 1 dime	50 cents	= 1 half-dollar
10 dimes	= 1 dollar	100 cents	= 1 dollar



**Making Sure
of
Arithmetic**

